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A RECORD & REVIEW *of* CURRENT THOUGHT AND ACTION

VOLUME TWENTY — *March, 1901* — NUMBER THREE

WITHIN THE GATES OF OLD AMSTERDAM

WRITTEN ESPECIALLY FOR OUR DAY

By EDWARD PAGE GASTON

A TYPICAL PEASANT

ON THE FISHING DOCKS

SCRUBBING IS SATURDAY

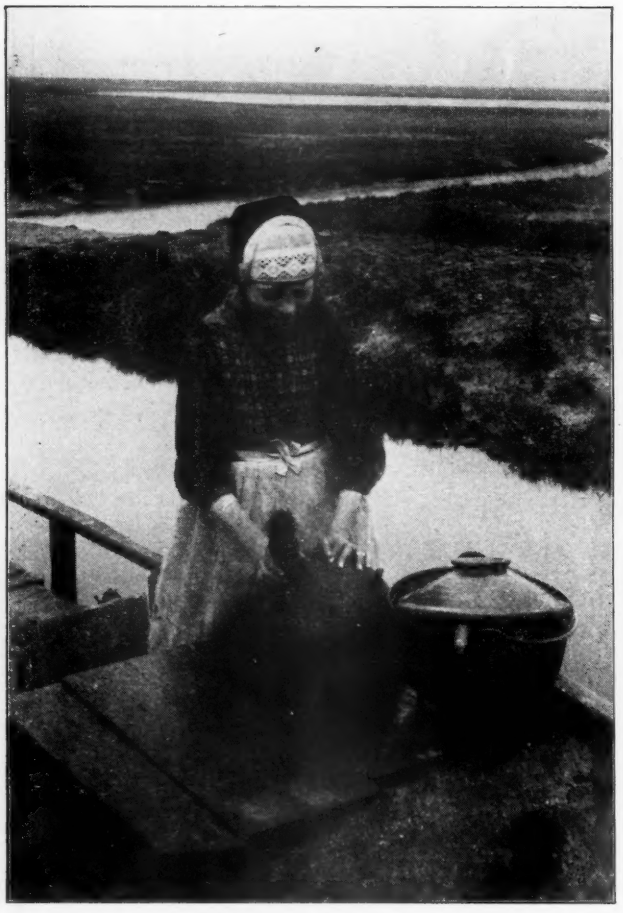
TEN has the clock! Ten has the clock! Close the gates and draw the bridge!" This was the cry of the night-watch of the olden days, as with pike and lantern, he made his round, and gave a final warning to all the good citizens of Amsterdam to be safely within the city gates before they were closed for the night. In other centuries the sentries had nightly peered the gloom in quest of lurking Spaniards, but long after "brave little Holland" had drowned out and driven out its oppressors, the war-time customs still held, and it is only of late years that the night-watch has ceased his patrols and wailing cry to measure the hours of the town's repose.

FISHERMAN FROM THE CHANNEL COAST

As the brisk Dutch metropolis has now grown far beyond its old confines, the ancient portals are rapidly falling victims to the press for room, and it will not be long until they will evidently all be gone from the posts they have so well stood and guarded, along the water-barriers made by the numerous canals about the city.

A thousand policemen are the present guardians of the town, wearing Roman helmets and armed with a saber and stick. They will take no fees, and are singular in this regard; for Holland is astep with the times on tipping, and it is endless. In two of the churches the eye is delighted with a printed placard requesting that no fees be given. A travel-tired and fee-weary stranger is inclined to get religion under such a reviving influence. If your friend has a new baby in the family, it is understood that the nurse will be blessed with a florin when you are leaving after the first call, and housekeepers advertise for servants at low rates of wage, "but with many fees." A domestic gets one hundred to one hundred and fifty Holland dollars a year, but many will count that as not more than half of their earnings, by the fees added. It takes an American quite a while to learn that he will not often go amiss by giving to everyone in a paid position, no matter how dignified and imposing he may be. One even has to fee the Government for prompt service.

When an investigative traveler lands in a strange country he will invariably begin to explore the mysteries of the native foods, and there are a number of unique things to eat and drink in Holland for one who knows where to find them. Milk carts with shining brass tanks are common in the streets, and do a good business on a thirsty day. In one of the parks there is a unique milk sale, for there are six cows standing by, to be milked as the customers give their orders. Three of the cows are white and three are black, and the steaming milk they give is in large demand. Nowhere have I before met with the poffertje, a variety of buckwheat cake of the size and appearance of a fried oyster. An immense griddle with rows of small depressions stands in a shop window on Kalverstraat, and as the little cakes brown on one side they are deftly flipped over with a fork. Two dozen of them are piled upon a plate, a fork of butter is laid to melt upon the heap, and powdered sugar is dredged above them. Commend me to the poffertje, and it is strange it has never found its way to the cosmopolite restaurants of America. Sour cream is another worthy dish which is set before a cafe diner, to be eaten with sugared bread, and called "zure room." Holland is the home of the chocolate of commerce, but the Dutch are not usually adepts at its making. All the world should go to Spain to learn the art of cacao brewing, where your sup of cinnamon flavored chocolate comes to



A DUTCH LASSIE

you delicate as a flower in its boquet, and piled with an inch or two of creamy foam from being lightly beaten by wooden hand-whirls.

A continual delight is the variety of costume seen on a Dutch street, or in a market-place. Every province has a distinguishing mark, and in some sections each village has a style of its own, generally shown in the head-dress. Holland has been rent with religious wars, so Catholic peasants know their fellows by the round hat while the Protestants wear high tiles. The women and girls who come to town can be promptly located being from Zeeland, or Marken, or Friesland, by the make of their linen headgear, and by the heirloom ornaments of gold or silver displayed as side-pieces, or in the skull-like helmets called hoofdijzers. Sturdy fishermen in the garb peculiar to the Zuider Zee, or the Channel Coasts, laboriously lug their heavy boats along the canals, the boats being sometimes tenanted by the whole family, including the dogs and even the chickens, all making of the barge the only home they know for the most of the year.

Contemplate with artistic regret the passing of the canals. The new portions of the city are built up in solid streets, and several of the principal thoroughfares are gedempt by their redeeming from the waters. Four thousand piles have been driven squarely in the old stream of one of the principal canals on the Damrak, as the site of the new million-dollar Bourse, and the movement is a steady one to fill up the canals of this Venice of the North as more room is needed for trade and traffic. Amsterdam will probably never be without some main canals, but the present trend is towards the eventual flat conventionalism of paved streets.

There are no clamorous newsboys on the streets, but old women sit in news kiosks on principal squares to sell the papers under the monopoly granted the company owning the stands. No extra editions are gotten out, for there is no one to cry them and a noisy American paper seller would have a short career at the hands of the unexcitable Dutch. Papers are dated a day ahead, and Monday's dailies appear on Saturday afternoon. In Latin countries where this is done I have heard the newsboys crying out their "papers of day after tomorrow!" There are queer signs for familiar things. The wooden head of a Turk or Moor means a drug-store; a large, gilded crown adorned with box-leaves and hanging under the red, white and blue of the Dutch flag indicates that fresh herrings have arrived in store. The crown is nearly always there, but the herring are often declasse, and decidedly ancient. A shining brass basin locates a barber shop, as the reminder of the time when customers were lathered from a shallow, sloppy bowl of soap and suds tucked under the hapless hirsute's chin, a manner which still prevails in some of the provinces, along with all the tortures of flaying which a Dutch barber's rack usually holds. The shops also announce that the man within is a haarsnidjen, or "hair tailor," and his patterns in coiffure are as old as his shears.

"Rule I. Please leave your wooden shoes at the door.

"Rule II. Kindly throw no vegetables nor decayed oranges at the actors."

Thus it was that the reglaments used to read at some of the old playhouses loving quietude and the peaceful progress of a poor play before a suffering public. I paid three Dutch dollars and twenty-five cents in Government tax, and went to hear Tannhauser in the Theatre of the State, which receives a subsidy of ten thousand guilders a year from the public treasury. The Netherlanders know well how to render German Opera, but the leading man in the cast looked like Gambrinus, while the first lady was too noticeably pugged in the nose and corpulent to fulfill one's idea of the part. There was not a dress-suit in the house, so far as I could see, and the men most agreeably kept their seats with the ladies 'tween acts, although the kaffiekamer and its refreshment temptations was near. The new Queen, Wilhelmina, does not like music, and she usually looks weary when listening to an opera or concert from the Royal box. But when the intermissions and the long pause come, she lightens up, and bows to the applauding people, and talks brightly to those with her. She would dearly love to ride a bicycle and do such things instead, but a girl whose birth has picked her out as a Queen must suffer many denials for the good of her nation, by being kept from dangerous amusements by a watchful Queen-Mother and Court.

Scrubday is Saturday in Holland, and in many parts of the country ordinary business takes a secondary place, in favor of the regiments of white-ruched domestics and housekeepers, who rule with brush and water on that day, with few to debate their rights. It is really unsafe to talk anywhere but in the middle of the street on a Dutch scrubday, for cataracts of water race down the house fronts, and floods sweep along the pavements. Force-pumps play upon the houses, as if there were a general fire in town, and barrels and barrels of water are dashed about with all the glad abandon which only a Hollander can feel when in his native element. As you walk along, there are servants lying in wait in every entry way, ready to dash out upon you with pails on the slightest provocation. A foreigner will instinctively quail when a deluge comes rushing directly at him, as flung by one of these hydraulic experts, but if he retreats he is laughed at, as they are so skillful that the flying water does not reach him, except, perhaps, to wet his feet—and who minds wet feet in watery Holland?

The windows are washed, the doors are worn of their paint, the facing of the house is dressed down with mop brushes, and the front pavement is left immaculate. Polishing powders are spread upon the brass door-handles and bell-pulls, and everything that offers the slightest excuse for being cleaned is charged down upon with such vigor as is known nowhere else in all the world. Spring is the pleasantest time of year to visit Holland, but there are few cautious travelers who dare press into the country in the time of its fresh beauty, for fear of the house-cleaning season. If the men of America think they suffer a mild martyrdom in May, they should go to the Low Countries in that same station, after which house-cleaning in their native land will seem a comparatively harmless style of feminine calisthenics. It is then that the accumulated energy of all the year reaches a very furore of soap-suds and mops at the hands of the housewives of the Netherlands, who revel for whole weeks in wild riot about the premises. Not only are the houses ransacked in a grand hunt for dirt, but public buildings and every sort of place come in for an accounting. If you apply for admission to a Palace or Museum, you are likely told that "they are being cleaned," but not understanding the Dutch tongue very well, you turn away, wondering vaguely whether it is the rooms or the pictures, or the attendants that are being renovated.

Attached to the street-windows of the houses are looking-

glasses, set at such an angle that a person within can readily tell who is at the door, or passing on the sidewalk. Unwelcome callers can thus be avoided, and the little spy-windows are in almost universal use, resembling the "busybodies" one sees in Philadelphia, which are peculiar to that city in the number in use, the idea evidently having been an ancient Dutch importation.

There are no alley-ways in Amsterdam, except where a canal makes a lateral from a main waterway. Domestics do their visiting at the front door of the houses, instead of over the background fence, and everything for the house is received there. Stairways to the upper stories are narrow, so the household stores are hoisted aloft by the pulley-beam projecting from the house-gable. All sorts of things go dangling up and down the air, and on a Monday morning a heavy fall of clothes baskets for the weekly wash comes raining down the ropes. One must "turn swift," as they say down South, to keep his head from under one of these descending extinguishers, which come soaring down out of the sky without previous warning.

Since being in Holland I have been hunting for the proverbial slums supposed to be a part of all cities, but there are no slums worthy the name in the country. The quarters of the poor are remarkably neat and clean, and the tenement-house horror has never deprived each family of the comforts of separated apartments, and space for a neat little flower-garden before the door. Two long lines of attached dwellings are built facing each other down a wide lane, open only to the use of the dwellers in the court, and fully half of this open space is planted with grasses and flowers and shrubs, the most of the garden-plats showing a real appreciation for the beautiful. Filling the windows are the tulips and bulb-plants for which Holland is noted, together with many other floral varieties. In the poorest street-markets there are great banks of potted-plants ranged on either side of the walks, and there is hardly a woman of the humblest kind who does not save her pennies for the buying of some coveted plant to brighten the home.

So frugal are the Dutch that an average of two out of three persons, taken the country over, have some sort of a savings system. There are many savings banks operated both by the Government and private banking corporations, but much money is tucked away at home by the humbler classes. When a baby is born, its financial fortunes are founded by the starting of a fund, added to frequently, and as the little fellow grows large enough to understand, he is taught that frugality is one of the chiefest of virtues. This explains why there are a thousand millionaires in Amsterdam, and little suffering poverty anywhere in Holland. Every child and servant must have his spaarpot, which is often a clay pig with a slit in his back. If this beast is regularly fed, he grows very heavy towards the end of the year, when his "killing" occurs, and the owners of the various competitive animals gather to count up the savings of the season. Often the pigs which have been the best fed are still lean, for Dutch boys and girls know how to shake the money out of the slot when needing a little extra to spend, just as they do in the United States. Servants usually leave the most of their earnings with their mistresses until the end of the year, when it is invested with the bank, or in interest-giving stocks.

In the Province of Friesland the young women pay for both themselves and their escorts at the yearly kermess held in many towns for the space of eight days, doing so in the hope that an engagement for marriage may result. A farmer's daughter or domestic servant will most frugally save her money during the year for these fairs, and as the time approaches there is great rivalry among them to secure the most popular young men in advance as their company, and guests. This practice of the girl providing the money is an old one in Holland, and is still largely in vogue among the humbler classes.

Stately individuals in high silk hats, black coats, trousers and pumps, and with immaculate linen, bear silver urns from door to door of the wealthy classes, asking alms for church and other charities, which the Government permits to be solicited for in turn at intervals of a week. So frequent are these and other requests for charity that the gifts are small, and one wonders if much more is received than enough to sustain the dignified style of the collectors. Beggars have their regular line of houses to pay weekly calls, which they make often while wearing very good clothes, laundried linen, and smoking a fragrant cigar! Higher even in the scale of refined mendicity are those who precede their visits with neatly printed cards

PEASANT DRESS

stating their needs, and announcing that they will call on a certain date. The Dutch are a charitable people, but are not discriminating, and there is no doubt but some of these beggars are wealthier than many whose benefactions they receive.

The Jewish colony numbers nearly an hundred thousand, but one of the favorite business inclinations of the Hebrew nature was checked by the Municipality establishing a City Pawn Shop. It is a large structure, built in 1550, and I believe is the oldest building in the city. On its front is a tablet bearing in old Dutch characters a rambling address, as follows:

"If you have no money nor no earthly goods, walk by.

"If you have the last, and not the first, walk by me.

"Give me pawn, and I give you money. Why should I trust you.

"Is it not enough that you live off my money?

"But when you bring the money, I give your pawn back.

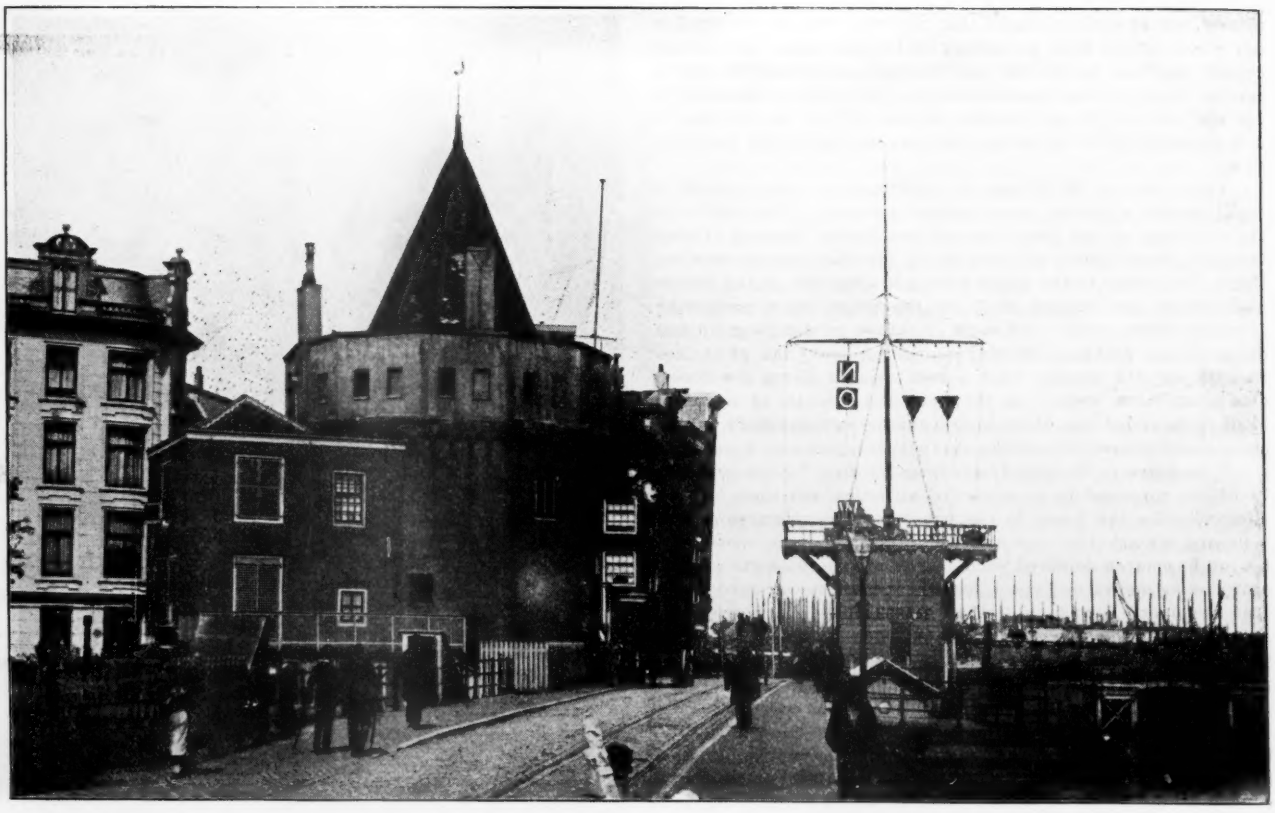
"But of course you give me the capital and interest.

"So I help you and myself and show the inquirer my philanthropy.

"This is the grave of usury."

Pawn charges are ten per cent. a year, and the weekly rates are accordingly so low that many people regularly pawn on Monday to withdraw on Saturday, and make money by the use of the capital thus gained.

One of the old landmarks holding a pathetic human interest is the "Tower of Tears," as it looks out to the Zuider Zee. There the wives and mothers of sailors and soldiers peered with straining tearful eyes upon the ships as they sailed out in the olden times to the wild coasts of the Indies, or America, and the women lingered until the last blur of the outgoing sails had faded away. It was there, also, that they were wont to go and watch for the boats as they came back from the long cruises, with the never-failing story of those who had paid the sacrifice of life for the making of the name of Holland great. There is the graven image of a weeping woman in the Tower, as a memorial to the griefs it has held, and the sadness it has endured.



THE PORT OF AMSTERDAM

CENTRAL SCHOOLS IN RURAL DISTRICTS

By ETHELBERT STEWART

GUSTAVUS township, Trumbull county, Ohio, four years ago, contained nine district schoolhouses and maintained that number of schools. The combined attendance gave an average of 125, the combined cost for the last year of the separate existence of the nine schools was $2,900. Four years ago a central four-roomed school building was erected, costing $3,000. A principal, three assistant teachers and a janitor were employed. Nine covered spring wagons with drivers who could give a bond of $200 each were engaged to convey the children to and from the school. Last year, with a stationary school population in the township, the average attendance was 144, the cost of the central school, including the wagons, was $3,156, an increase of $256 for the township, but a decrease of $1.29 a pupil on the average attendance. In the same county, Green township last year consolidated its schools, built a brick building with six large rooms and two small ones, one of these for a library, steam heat, good light and ventilation. Eight wagons conveyed the pupils. The school opened last September as a result of the experience of Gustavus township and Kingsville. The Kingsville experiment was the first made in Ohio, and resulted in a largely increased attendance and a net saving of $1,000 during the first three years. Madison township, Lake county, Ohio, consolidated six schools into two, and found that districts which had enrolled but eight pupils in the separate schools furnished eighteen to the union school, thus bringing out a greater percentage of the enumerated school population. The township board reports as follows: "It is more economical. Under the new plan the cost of tuition per pupil on the basis of total enrollment has been reduced from $16 to $10.48; on the basis of average daily attendance from $26.66 to $16.07." The process of consolidation has gone on in this township, and in a private letter to the commissioner of education at Washington the superintendent says: "There are five consolidated schools in the township. Five teams are employed to transport pupils at a cost of about $1 a day for a team. Each conveyance carries about eighteen pupils. There is no trouble in transporting the pupils, even the youngest, three and one-half miles, which is the greatest distance. The daily average attendance has increased from 217 in eighteen separate schools to 500 in ten union schools."

In Ohio and the middle west conveyance of children to schools is let by contract, and for the most part the central township school idea is in favor. In New England consolidation of two or more schools has preceded the central township idea, but the latter is becoming more popular. In New England, also, the means of securing attendance upon the union or the central school varies. Direct payment to the parents of an amount ranging from 10 cents a day to $3 a week per child, according to the distance, is made often in Massachusetts and Connecticut. Sometimes the school is closed and the car fare of the children is paid to the nearest town school. Often the township hires carriages by the day; or, the township owns the vehicles and hires a driver. This latter plan is strongly urged by the state superintendent of schools for Rhode Island, who makes the point that as the wagons must be of an unusual character the town should own them; then any one who had teams could enter bids, whereas now few care to bid because of the special wagons necessary to carry out the contract. The practice of letting contracts by the term or year, as in Ohio, obtains to a certain extent in New England. Connecticut reports eighty-five schools closed, 773 pupils conveyed at a cost last year of $10,752. Vermont reports 590 pupils conveyed to school one term, 570 two terms and 770 three terms a year at an average cost of $4.56 a pupil a term. Massachusetts began the system of closing small schools and conveying pupils to union or central schools in 1869. Of the 229 towns that have closed one or more of their schools 60 per cent. report the cost less, results better; 15 per cent. report the cost the same, results better; 8 per cent. cost more, but results better; 8 per cent. cost more, but do not report on results; 8 per cent. cost less, but do not report on results.

As I stated in The Chicago Record, the answer to the objection that children will be too long on the road is that the system produces the greatest good to the greatest number.

TRIUMPHS AND FUTURE OF THE CIVIL ENGINEER

By FRANK W. SKINNER, Member American Society of Civil Engineers

[There has been perhaps no field of industry which has undergone such changes or made such progress as the field of the civil engineer. Writing of this in The St. Louis Globe Democrat, Mr. Skinner shows how much we may yet expect in the transformations which are being made.—Editor.]

CIVIL ENGINEERING, three generations ago, was summed up in surveying, road-making, masonry building and designing heavy machinery, and its masters could be conversant with the whole recorded horizon of the profession. Now it is divided into recognized fields, each of which requires a lifetime of study and concentration. There is mechanical, electrical, mining, naval, railroad, geodetical, hydraulic, structural, municipal, and sanitary engineering. The scope of the first four is too elaborate and technical for present consideration. Geodetical engineering includes the most accurate and extensive surveys. Structural engineering may here be considered as chiefly the building of steel, masonry and timber bridges, buildings and foundations, thus including the essentials of modern architecture; and the other great branches deal with the specific works their names imply, the different ones overlapping each other on all sides.

The geodetical engineer measures on the Atlantic coast a base line a few thousand feet long with an accuracy of 1-5,000,000th part of its length. From it he triangulates more than 2,000 miles to the Pacific coast and measures the total distance with an error of less than 100 feet. His lines are corrected for the earth's curvature and for the refraction of the atmosphere. His levels are carried over mountains, chasms and deserts so perfectly that the difference between the tides of the Atlantic and Pacific oceans are accurately measured, and long canals are planned and built with perfect control of the water level and flow. He extends his maps to delineate the deep bottoms of rivers, lakes and seas. By his plots and charts, curved, crooked and sloping tunnels are driven under land and sea so accurately that they can be started simultaneously from many intermediate points and meet almost as perfectly as the tubes of a telescope. In his field of engineering a perfection sufficient for present requirements has been attained, and few radical changes may be anticipated. More delicate instruments and cheaper methods may be provided, but the results will not be noticeable to the layman. Long before the close of the twentieth century the hydraulic and railroad engineer will probably find every portion of the country so exactly mapped that, without a survey, he may locate the roads and canals and connect works hundreds of miles apart by measurements from the nearest monuments.

The railroad engineer has already brought his train speeds up to a possible rate of 100 miles an hour for short distances. Beyond this the limit of safe endurance of his materials is not far distant. The dangers to life and property are so much multiplied, and the expense so disproportionate for farther increase that the maximum speed will hardly become notably higher. A great advance will be made in the ordinary speeds, the perfection of service and the safety of trains. There will be far less proportionate construction of new railroads in the United States, and far more in Africa, Asia, South America and in some parts of Europe. Asia will be traversed by the thousands of miles of the great Siberian railroad, now being built. The Soudan is already reached by a military railroad that may be the entering wedge for the development of the Sahara, and the Intercontinental railroad across the Andes has already been surveyed. Wherever commerce or travel justify it, the tallest mountains and the widest waters will be crossed by railroads. In many places the steam locomotive will give way to cheaper, more agreeable and more efficient motors. The terminals in the great cities will be combined in great union depots.

In hydraulic engineering, the development of water powers, construction of irrigation works, canals, river and harbor improvement, and the water supplies of cities, include the principal classes of work. Until within a half score of years the development of water powers has been limited by the wants of adjacent manufacturers and the difficulty of handling, so that many of the best power sites were unavailable. Now power can be transformed to electricity and can be so advantageously applied and transferred that numerous large water powers are being utilized. The most notable instance of this is at Niagara Falls. Millions of dollars have been spent to convert less than the fiftieth part of the potential energy of the falls into commercial horse-power. Water from above the cataract is taken down deep shafts and through an immense tunnel blasted out of the living rock and discharged 200 feet down at the surface of the river, a mile below the falls. Great turbines are floated in the water at the bottoms of the shafts and drive huge dynamos in the power house above, from which the electric current is transmitted many miles to furnish light and power for a great city. Eventually no great stream will be allowed to waste its energies. Its forces will be transmuted by turbines to power, heat, light and motion, for factories, cities and railroads, hundreds of miles away.

Costly dams and conduits to store rain and flood waters for irrigation of arid plains and transform them into fertile gardens have reclaimed millions of dollars worth of land in the United States. Nearly $9,000,000 is now being spent on such constructions to regulate the Nile and irrigate Egypt. Careful surveys indicate that a channel could be cut to admit the sea to the Desert of Sahara, transforming it to an inland ocean and creating there a new climate as well as a new geography.

Within fifty years canal building has been wholly revolutionized by the use of high explosives, steam shovels and dredges, mechanical systems of handling the excavated materials, and notably, by machinery for chiseling the vertical rock sides as smooth as a plastered wall. New types of powerful machinery will be perfected, and the work will be done so much more cheaply that greater and greater enterprises will be undertaken, and ships will sail across continents instead of around them. Work has already been commenced on a ship canal across Central America, which will change two continents to islands. Able engineers and capitalists propose to reorganize the ill-fated Panama Canal company and complete its great enterprise. Instead of tedious and wasteful lockages, large boats will be lifted, in some cases 50 or 100 feet, in steel tanks by hydraulic pressure.

In structural engineering the application of timber in this country has reached a maximum, and is fast going out of use for important structures other than those constantly saturated with water, steel being substituted for it. The general features of bridge design and the methods of construction will not be greatly changed henceforth. The dimensions of the bridges will be increased, even multiplied; materials will be improved and strained much higher than is now allowed. Steel truss bridge spans may reach, but will hardly exceed, 3,000 feet. Suspension bridges can be built longer. Fifty years ago iron had a strength of barely 50,000 pounds per square inch. The latest steel specifications call for 200,000 pounds, and this will be exceeded by metals of still greater strength. While limits may be set to the length of single spans, they can not for bridges as a whole. The long-proposed bridge across the English Channel only needs political and financial authorization to be possible. The second largest and much the grandest bridge in the world is well under way to connect the boroughs of Manhattan and Brooklyn. It will have a river span of 1,600 feet, a width of 118 feet, twice as great as an ordinary street; will carry six lines of railroad track and have a total weight of more than 100,000,000 pounds.

Steel buildings are the modifications of bridge work, and their sudden appearance, giants at birth, is the most remarkable example of a whole class of great structures coming to perfection without a slow development. The height of the thirty-one story Park row building in New York City, which is 424 feet, will hardly again be equaled, unless for mere notoriety, because it is unnecessary and undesirable, but the greatest existing roof span will doubtless be much exceeded, and can even be multiplied almost ten-fold if any reason should justify such vast expense. Structural freaks, like the 1000 feet high Eiffel tower, and the Ferris wheel, 250 feet in diameter, will be limited only by the range of ingenuity and the strength of materials.

The construction of massive foundations under water for bridge piers and in treacherous soil for tall buildings has developed special designs of steel and concrete, and ingenious scientific methods of pile driving, pneumatic caisson work, etc., which have reached a high degree of perfection; but new forms of substructures will probably, and new methods and appliances will surely be invented.

In two or three years Manhattan Island's present daily supply of 200,000,000 gallons of water will be increased by the stor-

age of 32,000,000,000 gallons of water in a reservoir fifteen miles long and 157 feet deep. This will be formed by the building of the world's greatest dam, which will cost $6,000,000. Its vast mass of masonry will rise about 300 feet above its foundations, which have been sunk 130 feet below the bottom of the river which they cross.

In municipal engineering feats such as this there will be vast advances in the years to come. Unpolluted drinking water will be supplied to the public, and if it is not available without, it will be filtered on a great scale. Vile sewage will be filtered, chemically precipitated, or made a valuable irrigant. Garbage and solid refuse will not be left to putrefy in the streets nor burned at an expense, but will be reduced in large plants, whose product will yield a profit. Heat and cold, light and power, will be disseminated from central stations as water and gas now are. Real rapid transit will be secured by complete tunnel and viaduct systems in great cities, and the trains will be drawn by silent, smokeless, speedy motors. Already the displacement of draught animals in cities by automobiles has commenced. Improved methods and economies in generating, transforming and storing power will more and more supplant human labor, as well as multiply automatic vehicles for business and pleasure on land and water. There is as yet, however, no sign of discoveries revolutionary enough to realize that alluring mirage, aerial navigation. No single invention will accomplish it, and the slow development which leads to great engineering possibilities does not yet predicate for this.

The field of the sanitary engineer has been almost entirely comprehended in that of the municipal engineer. His part will be to aerate, oxydize or filter water supplies; to protect them, sometimes in vast covered reservoirs. He will drain swamps, and reclaim poisonous marshes. He will so proportion great sewers that the comparatively clean floods from storms will be safely carried away by them and harmlessly discharge into rivers, while the smaller flow of sewage is taken to the disposal grounds. Where the city is too low and flat for sewer grades he will establish wells and pump their contents to its final destination. His will be the task to wash out foul rivers, as in Milwaukee, where the contents of a large tunnel are continually forced by a great pump, from the lake, to flush out an otherwise stagnant river. In his hands will lie in large measure the health and comfort of millions of people in all cities.

MANAGING a CITY on BUSINESS PRINCIPLES

ONE of the greatest political problems on the part of municipalities is how to get rid of partisanship and ring rule in the interests of economy and a better administration. Hon. Thomas G. Hayes, the Mayor of Baltimore, Maryland, tells the New York Independent how that city is managed in these words:

The present charter provided by the laws of Maryland for the city of Baltimore makes it possible, in my opinion, for the administration of municipal affairs upon a strictly business basis, and the elimination of evils which may arise where personal and political interests are given preference to public obligations. I have construed the provisions of the charter to mean that the Mayor is held to strict responsibility for the several departments, and for this reason is vested with more authority than is usual with municipal executives. With this interpretation I have endeavored to select as the heads of such departments men who are not only appreciative of the trust devolving upon them, but who are capable of performing their duties to the best interests of the city. I can say here that I believe the officials selected are thoroughly qualified for their positions. My conclusions are based upon what has thus far been accomplished.

Since entering into office I have given consideration to a number of measures by which it seemed to me economies could be effected and better results obtained. Among these is the letting of a contract to an individual for removal of garbage, ashes and refuse, the work to be done under the direct supervision of a city official. I have thought this advisable, as under the contract system it can be done more cheaply and effectively than when undertaken by the city. One benefit of the innovation is to avoid the danger of political patronage in this department. The employment of such a large number of men as cleaners and teamsters offers a temptation to reward political followers for their services at the city's expense. It is a patronage that should be abolished whenever possible, for the results accomplished by this or any other department cannot be as beneficial if influence and not ability is considered in the selection of employes. Let me emphasize the fact that if a city is to have a business administration, political patronage, as it is termed, must be thoroughly eliminated. By making the contract referred to, the contractor employs his own men, and is responsible, for the city is secured by bond for the faithful performance of his obligation. It is not likely he will use inefficient labor when he would be the loser by so doing.

A contract has also been given a private individual for lighting a portion of the city, for the reason that a considerable saving will be effected, and we believe that it will be done as thoroughly as by the former plan. Here again an opportunity is offered to dispense personal favors which is avoided if the contract is carried out. The import of the charter in allowing the contractor to furnish his own lighters has been doubted by some, but I believe that the courts will construe my position to be correct, in a friendly suit which is pending.

As to the control of lighting plants, water works and street railways by the city, I am not prepared to express an opinion. I know the experiment has been tried successfully in several British cities, and perhaps municipal ownership might result favorably in Baltimore, but the conditions abroad are so different from those governing American cities that it is questionable if Glasgow, for instance, with its control of such improvements, could be cited as a precedent for Baltimore.

I do not hesitate to say that I believe a city government can be, and should be, modeled like a business corporation, and that it is the only true way to conduct its affairs. I believe I am justified in my position by the progress we have thus far made in Baltimore under the present charter. For example, we may take the Water Department. After investigating its organization I decided that one branch was not necessary—that its work could be distributed among the others and that several offices were merely sinecures, although large salaries were attached to them. The branch referred to, as well as these offices, was abolished. Through economies thus effected and the faithfulness and ability of the officials and employes we are enabled to show a surplus for the year just closed of $229,000. The Fire Department has been conducted on such a system that, although its efficiency has been improved and in no way has it been impaired, it will have a surplus to its credit for the year of about $20,000. The contract for disposal of garbage, etc., amounts to $148,000, although the lowest estimate by which it could be done by the city direct was $188,000. Thus a saving of nearly $50,000 is effected, while the refuse will be disposed of by a crematory plant—a great improvement on the old system. We found that by using the waste power in one of the city water pumping stations electric lights can be supplied our principal park. By the present plan this costs $9,000 a year. The expense of the electrical machinery will be only this amount, but by using it the expense of the illumination will be cut down to $4,000—a reduction of $5,000 annually. Even the City Jail account will show a surplus of about $7,000 for the year, as we are employing the convicts at repair work and other labor for which outsiders have been paid by the city. The Jail Board has under consideration the employment of a portion of the inmates on outside work not in competition with organized labor, and I do not know but I strongly approve of the measure. It is a plan by which their services could be made of more value, and they would be benefited by exercise which they cannot obtain under the present system of confinement.

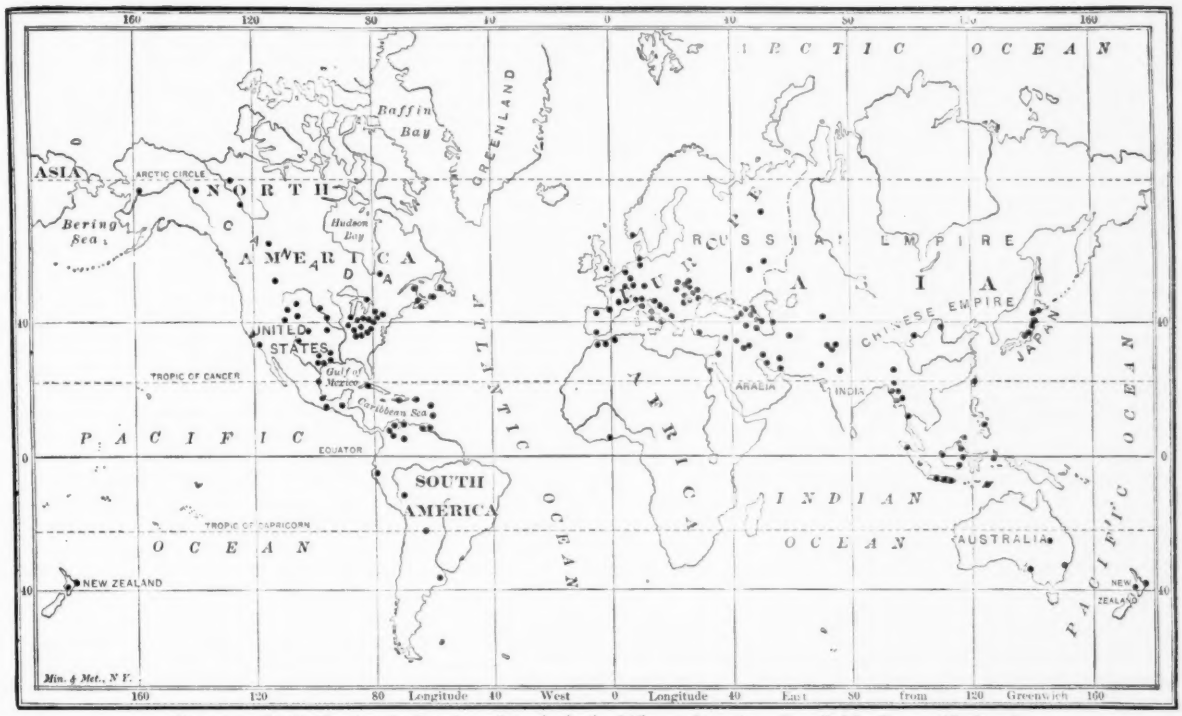
CLIMATE AND OLD AGE

IT has been generally supposed that the strong and aggressive peoples of the north are the long-lived. This statement, however, would appear incorrect in view of the statistics brought together by the Indian Medical Record. The writer says

More people over 100 years old are found in mild climates than in the higher latitudes. According to the last census of the German empire, of a population of 55,000,000 only seventy-eight have passed the 100th year. France, with a population of 40,000,000, has 213 centenarians. In England there are 146; in Ireland, 578; and in Scotland, 46. Sweden has 10, and Norway 23; Belgium, 5; Denmark, 2; Switzerland, none. Spain, with a population of 18,000,000, has 401 persons over 100 years of age. Of the 2,250,000 inhabitants of Servia, 575 have passed the century mark. It is said that the oldest person living is Bruno Cotrim, born in Africa, and now living in Rio de Janeiro. He is 150 years old. A coachman in Moscow has lived for 140 years.

THE PETROLEUM INDUSTRY OF THE WORLD

By DR. DAVID T. DAY



Map of the World, Showing the Petroleum Deposits in the Different Countries.—Compiled by Boverton Redwood.

SCARCELY a home does not make use of petroleum in some of its forms and yet few intelligent people can give an idea of the extent of the industry, or an explanation of how petroleum was produced in the earth. Dr. David T. Day, in an article on this subject in Mining and Metallurgy, covers the subject exhaustively and from his paper the following extracts have been made:

Large as is the quantity of petroleum produced in America, the question is sometimes asked: How long, under the present enormous consumption, is the supply likely to last?

It is argued that the allied fuel, natural gas, has already given out in some places, and that our oil wells may become exhausted in the same way; while, moreover, we in the United States produce less than half of all the petroleum that the world uses.

There seems no present cause for alarm that the supply of petroleum will be inadequate to meet the demand.

Russia, from her deposits on the Caspian Sea, produces a little more oil than does the United States, the aggregate being over 60,000,000 barrels.

To be sure, it is not such good oil as ours for burning. We can turn 75 per cent. of our crude oil into illuminating oil, while 26 per cent. is considered a good yield from Russian oil.

It is the custom in the great refineries which have grown up in Russia to distill off the part most suitable for lamps, there being also an ample demand for the residuum.

Besides Russia, the oil fields of Roumania are of growing importance. So are new discoveries in China, while the oil producing industry in Japan makes rapid progress.

Java, Sumatra, Borneo, (and possibly the Philippines) are capable of adding to the supply, and there are further stores in Peru and elsewhere in South America.

It should be borne in mind, by the way, that oil prospecting is not so simple as is the search for other minerals. It is noticeable that oil, thus far, has been found principally near well-populated districts, leaving less accessible territory for future prospecting, when the present supply may threaten to decline.

Already Alaska is being studied. Oil prospects near Cook's inlet and on the Copper River, for example, are attracting considerable attention.

Petroleum occurs most irregularly, both geographically and geologically. It is found here and there in the Old World as well as in the New.

There is no geological period characteristic of it. We find it in Tertiary sands and gravels in Russia and in California, and in rocks as old as the lower Silurian, in Ohio and Indiana. Even in eruptives we find occasional traces of it or of allied bitumens.

This gives additional interest to the speculation as to where it came from, the disputes on which subject have been as varied as the speculations have been vague.

In California, in Texas, and elsewhere in this and in other countries, prospecting goes on apace, and oil wells are being rapidly developed. The number of oil prospectors (many of them men ignorant of the rules of petroleum occurrence), is increased by those who, in looking for or developing other minerals, literally "strike oil."

While petroleum is scattered over a great area, the principal deposits so far discovered follow the fortieth parallel of north latitude through the oil regions of Ohio, West Virginia and Pennsylvania.

Eastward we find them again in Galicia, and the same line not only runs almost directly through Baku, in the great Russian field, but the Japanese deposits are on nearly the same parallel.

This signifies simply that the fortieth is the parallel of greatest general industrial activity. Possibly it is also promising for future oil developments. By no means has advantage yet been taken of all the oil of this fortieth parallel. The probability is that the deposits of Wyoming will prove very valuable when the Western increase of population justifies their utilization.

The beginning of the industry must be sought in China. The Chinese laboriously produced oil in small quantities, not only before the discovery of oil in the United States, but even before Columbus was born. Nevertheless this has been without appreciable effect upon the development of the industry. The Chinese still persist in using the most antiquated methods, for lack of the enterprising spirit which characterized Colonel Drake at Titusville, and has since continued to animate his industrial successors, here and in Russia, making of this industry a world's wonder.

The industrial development of the well-known wells of Baku deserves special comment.

The principal peculiarity of this Russian field is the pressure under which the oils were stored. When struck the oil is thrown out with great violence and thus wasted. An American company became bankrupt through paying for property ruined by the vigor of its wells.

No discussion on the subject of petroleum can fail to bring up the question as to the origin of oil.

We can safely say that this question is neither settled nor is likely in the near future to be definitely settled. The uncertainty is due to the preponderance of theory over facts with which to prove theories.

The geological work which has been done is by no means so extensive as are the chemical demonstrations made by experts either unacquainted with or out of sympathy with natural processes. To appreciate this matter, recall for a moment the three theories advanced—first, that ascribing the origin to the decomposition of vegetable remains; second, that based upon the decomposition of animal oils, and thirdly, that based upon chemical experiments.

This last shows that hydrocarbons, including many found in petroleum, can be derived from the interaction of strictly organic substances, such as metallic carbides acting upon water. Experiments show that it is perfectly easy by the action of calcium carbide upon water to produce a gas closely related to petroleum.

Quite recently we have learned that the carbides of different metals yield different hydrocarbides. Thus, carbide of aluminum yields natural gas when treated with water. Biasson found, in 1871, that not only will iron or suphide of iron, acting on water containing carbonic acid, give oils like petroleum, but that when a carbide of iron, such as ordinary spiegel iron, is treated with hydrochloric acid, or sulphuric acid, or even boiling water, petroleum-like oils are obtained.

In 1879 Mendeleef added an elaborate theory as to the organic origin of petroleum.

How does this idea of the formation of petroleum correspond with the conditions of its occurrence?

Evidently petroleum oils can be made by this means. It is highly probable that the conditions suitable for its formation have repeatedly occurred, and therefore it would seem folly not to believe that some petroleum is of inorganic origin.

Richardson has found that the water which issues with the asphalt from springs on the island of Trinidad contains boracic acid, which geologists are wont to associate with eruptive substances. Bitumen has been found surrounded with the sublimed quicksilver ores at New Almaden, which Becker has shown to have come up under conditions of heat and pressure. Hydrocarbons have shown themselves in large masses of eruptive rock in Eastern New York and elsewhere, and they have also been found in the volcanic rocks of Mount Etna, and hydrocarbons have been found in meteorites.

It would be strange if in all these cases none had come from inorganic materials. Still, many of them may be simply redistillations, due to the passage of hot eruptives through bituminous strata. There is no conclusive evidence of the inorganic origin of any large deposit of petroleum.

The proximity of the Pennsylvania oil to coal of apparent vegetable origin has given rise to the theory that these oils have also a vegetable source. Geologists are familiar with the way in which decaying vegetation leaves an ever-increasing layer at the bottom of large peat bogs, which, growing denser, gives an unbroken gradation into all kinds of coal. This method of storing up fuel suggests the great probability that some form of similar vegetal decay has also yielded petroleum. Even coals contain hydrocarbons of some kind.

McGee calls attention to the large amount of oil stored in recent strata, and makes the rule that, taking the whole supply of oil into consideration, the greatest quantity will be found in the youngest rocks—as in the great Russian fields.

If I interpret him aright, what he says is in line with the simple theory that our petroleum is the normal product of such organic matter as is continually being buried with all sediments. He calls attention to the petroleum occasionally noticed on the surface of the lower Mississippi river, and considers it derived from the recently deposited sediments. Still, the chemical side of the theory is lacking. We do obtain marsh gas by just this means, though this is an exceptional case. We cannot yet say that, without question, oils are formed from such new sediments. A theory as to the source of Pennsylvania oils, which has recently been advanced by Rev. John N. MacGonigle, has, to my mind, more in its favor than any other. In his own words, as written to me, Mr. MacGonigle says:

"It may be admitted that the marvelous deposits found in the Trenton and Clinton limestones, and widely diffused in the other limestones and shales of the Silurian period, are indigenous. It is a well-known fact that the series constituting the Silurian age, as the result of one of Nature's wonderful convulsions, sweeps toward the eastward under the Devonian and carboniferous areas, forming the floors of the basin in which the measures of these periods were deposited. The uplift which forms the Appalachian chain occurred at the close of the carboniferous period. This was due directly to heat action.

"It is, therefore, at least suggested that the petroleums of Pennsylvania owe their origin to the effect of this heat upon the underlying limestones and shales of the Silurian age. The theory is that the same force which caused the Appalachian chain to unlift, passing through the limestones and shales of the Silurian age at a modified temperature, distilled the oil already contained in these shales and conglomerate sands of the Devonian age, where it was condensed and filtered, and found its home in the open, porous conglomerates which characterize the Catskill, Portage and Chemung periods of the Devonian age."

While this tends to connect the Pennsylvania oils with sulphur-bearing oils of Ohio and Indiana—for which animal origin is urged—it does not set aside the vegetable theory for all oils. It is difficult, at least, to produce paraffin oils from the destructive distillation of vegetable matter, but not all our oils are paraffin. The Russian oils are more nearly related to paraffin.

Considering the ease with which petroleum oils can be obtained from fats, and the plentiful supply of such fats in the animal remains, of which there is evidence in many oil rocks, such as Silurian limestones, it is not surprising that the opinion has gained much ground favoring the animal source of the limestone oils of Ohio, Indiana, and Canada. Peckham insists equally strongly on a similar origin for California oils.

The Russian oils show more evidence of vegetable origin. These contain a substance similar to the distillation products of coal tar—such as benzole. This discovery is due to the exceptionally good work by Russian and German chemists in this field, from the results of which most of our modern ideas of the chemistry of petroleum have been derived. I think that in mentioning some of these results you will come to look upon petroleum, not as a single oil, but as one of the most complex mixtures with which modern industry has to deal.

Not only is petroleum a mixture of many oils, but it is the exception for one to find two samples alike. The products of our thousands of wells all differ more or less one from the other, and not one of them is at all like the oil found in Russia, Java or Peru. Sands 50 feet apart, one above the other, will yield oil differing markedly in specific gravity, in color, and in the proportions of the various constituents. The product from the same well changes its character from time to time.

A DEFINITION OF COURAGE

SEVERAL writers, among them Theodore Roosevelt and Richard Harding Davis, have recently devoted themselves to a definition of the qualities of heroism and courage, especially as exemplified in warfare, but it is to be noted that the kind of heroism which is exemplified in pursuits of peace still secures little recognition. Courageous deeds in warfare are fine, but it is a question whether acts calling equally for self-possession and heroic sacrifice are not common in everyday affairs. The fortitude and courage shown so often by professional nurses in the pursuit of their regular calling are of a high type. The little band of men and women penned in isolation hospitals, face to face with contagious disease in its most loathsome form, are not lacking in heroism.

In fact, it may be set down as a principle that among a highly developed and progressive people the element called courage—have one thing in common. The nurse who faces smallife and in all lines of endeavor. There is apparently little resemblance between the leading of a cavalry charge and the performance of some of the unromantic duties of everyday life, but at bottom the two acts—and, in fact, all acts calling for courage—have one thing in common. Thenurse who faces smallpox, the ship captain who sticks to his boat to the last, the engineer who reaches for the reversing lever the moment before a collision, the bellboy who risks his life warning the guests of fire, the day laborer who throws himself in front of a train to save a child and the soldier who makes a charge—all those who in the face of danger continue to do the thing which has been set for them to do, either by the fortuity of chance or in the regular pursuit of their calling, are obeying a common principle.

As the editor of The Chicago Record remarks, "It is fair to say that courage, primarily, is the determination to perform a duty, without danger if possible, without regard to danger if it be unavoidable."

PROFESSOR PUPIN AND THE SUBMARINE CABLE

Prepared for Our Day by CYRUS HOLDRIDGE

WHEN the telegraph was first invented it was doubted if it would be possible to send a message more than a few miles. When the telephone was invented the difficulty was increased. For years scientists and experts have grappled with the problem of how to prevent waste and prolong the electric current. If it had been possible to do this by a discovery, that would have been made long ago. But it was not until a pure invention was made by Professor Pupin that it was found possible to prevent any waste whatever and prolong the electric current indefinitely. Professor Pupin's invention has demonstrated the possibility of telegraphing across the ocean and substituting telegraphy at the rate of 1,000 words a minute for the present system of fifteen to twenty words a minute used in cabling across the Atlantic. His invention is not so revolutionary in its character as was the first use of the telephone, or even as is the introduction of wireless telegraphy, but it is important enough to warrant general attention and valuable enough to be acquired by the American Telephone and Telegraph company for $500,000 and a large annuity to the inventor.

It was in 1895 that Prof. Pupin began his series of experiments. With the systems now in use only very long electric waves can be produced. These waves are hundreds of miles long, and the main difficulty in finding a way of studying their effects lies in just this fact—their great length. There were, previous to the work of Prof. Pupin, no laboratory experiments possible by which to prove any mathematical theories regarding them. Indeed, it was not until Heinrich Hertz produced electric waves short enough to be measured in a laboratory that the study of electric waves and their effects received much attention. Even then the subject was difficult of approach so far as its application to telephony and telegraphy with wires was concerned. The laws for the Hertzian waves do not hold for the long waves, for the reason that the Hertzian waves radiated in free space and the ordinary telephone or telegraph waves are forced along a single path or wire. Prof. Pupin pointed out this fact to his fellow-scientists some two years ago, and explained then to some extent his method for overcoming the difficulty.

It is interesting to note that the vibration of the Hertzian wave is many millions per second, and the waves vary in length from a few inches to a few hundred feet. Marconi uses this form of waves for his wireless telegraph work. The ordinary telephone or telegraph wave, on the other hand, as has been noted, is hundreds of miles in length, and is produced by vibrations of only a few hundred or a few thousand per second. Now the chief drawback to long-distance telephony has been the blurring of the vibrations which act on the telephone receiver, caused by the action of these long waves. In telegraphy the main difficulty seems to have been the loss of energy along the line, together with the great resistance of a long line. These difficulties Prof. Pupin set about to overcome by an apparatus which would produce short waves and reduce the evil effects of resistance.

How was he to produce shorter waves? He brought to bear first the light of other science on the problem, and, taking the action of a wave of light in passing through different mediums, thus producing various wave lengths, he applied the principle to electric waves. For example, the wave length of sodium light is shorter in glass than in vacuum—light travels slower in glass than in vacuum, and if one could increase the index of refraction of glass to anything he wished, he could decrease the wave length in that glass to anything he wished. As the medium grows denser the energy it stores up increases. As Prof. Pupin argued, if a substance which stores up a thousand times as much energy as a vacuum be placed in the path of the ray of light the waves will be one-thousandth part as long in that substance as in the vacuum.

Now apply the principle to electric waves. Prof. Pupin found the necessary medium in a certain "choking coil" of wire which he inserted at intervals in his telephone circuit. In one of his earlier experiments, he connected in a singular circuit fourteen coils of wire, each of which was capable of storing up the same amount of energy as ten miles of telephone wires, that is to say, each had the same amount of self-induction, resistance and capacity as ten miles of telephone wire. The coils were placed three inches apart, making a total length of three and a half feet. He had, then, the equivalent of 140 miles of telephone wire. A wave 140 miles long would develop its whole wave length, taking a spiral course now, in the fourteen coils, but as it had gone over three and a half feet its rectilinear velocity, and, therefore, its rectilinear wave length, was reduced to three and one-half feet, a reduction to less than one-two-hundreth-thousandth part of its original length. Thus very simply, it would seem, Prof. Pupin found a way of creating short waves, and, having found them, of making swift and accurate electric communication possible over much greater distances than before. One of the great obstacles to ocean telephony was then removed. It remained to arrange the coils along his wire or cable in such a manner that the right effects would be produced, by so adjusting each coil that the energy sent through the circuit would be conserved. It is in the adjustment of the coils that the virtue of the invention consists, and the explanation is too technical for general comprehension. It is sufficient for the general laymen to know that these Pupin coils overcome the evil effects of electric resistance and make possible another great step in practical progress.

To illustrate the invention by Prof. Pupin's present laboratory apparatus 250 miles of wire are supplied with 250 "choking coils," one coil being inserted in every mile of the circuit. It was found that the absorption of energy which generally takes place along a telegraph or telephone circuit was greatly reduced. Accordingly the same amount of energy sent out from the transmitter would go much farther with his apparatus. It was a problem of equally distributing capacity, self-induction, and resistance.

In its outward appearance, Prof. Pupin's laboratory presents a curious looking apparatus. Over on each of five tables stands a box about two feet square, in which is contained fifty miles of wire, representing, if you will, fifty miles of ocean cable. From each box project connections for 200 wires and these wires are attached to fifty coils, each coil being supplied with four terminals. The coils themselves look like small earthen jars open at both ends; in reality they are merely made upeach of two coils of wire of different sizes carefully insulated from each other and having the effect of an ordinary induction coil. Doubtless, in the working out the right relations between these two sets of wires in the coil, Prof. Pupin encountered his greatest problem. To get the effect which should give the proper resultant on his circuit was most important, but once the relation was established, the principle could be applied commercially to any extent. It is in this part of the apparatus entirely that the utility of the invention consists. By the use of these coils, properly adjusted and properly placed along the line of desired communication, the system can be applied to any kind of electric communication.

With the circuit of 250 miles which Prof. Pupin has arranged, he has found that one coil every mile will bring the right result. In the case of ocean cables, this proportion may not hold good, but Prof. Pupin does not anticipate any difficulty in adjusting his method to the required conditions. Of course, the use of the apparatus will entail a new system of construc-

tion in telephone and telegraph wires. Our telephone wires of the future will have one of Prof. Pupin's coils inserted at certain intervals along the line of communication. For this reason, a revolution in the present system of cabling can not take place at once. A new cable must be laid, a Pupin cable it may be called, which will differ from the ordinary cable by having perhaps thousands of these little induction coils attached to it. Up to the present time the longest distance accomplished for telephony is some 1,500 miles, but Prof. Pupin anticipates no difficulty in telephoning several thousand miles. Already experiments have been made looking toward the application of telegraphy at the rate of 1,000 words a minute with the new rapid telegraph instrument attached to this apparatus, and there seems to be no reason why success should not follow. Indeed, Prof. Pupin says that rapid telegraphy in connection with his system is an assured fact.

With Prof. Pupin's apparatus a much larger proportion of the energy imparted to the transmitting end of the cable will be received at the other terminal, and the reflecting mirror and sine wave method will be unnecessary. Messages may be sent and received through a transatlantic cable as readily as a message can now be sent from New York to Philadelphia. More than that, ocean telephony is possible. We may talk with friends on the continent as readily as we now talk over a distance of a few miles.

The attachment of these coils will also solve the problem of transmitting power over wires for any distance with economy. The great difficulty now in transmitting power from Niagara Falls to New York, for example, is the wastage. Steam is much cheaper, but by the new process this wastage may be saved. There are many other branches of electricity in which Prof. Pupin's invention can be utilized, its great advantage being, according to the experts, that it will add 1,000 per cent. to the usefulness of almost every form or application of electricity. In an address delivered by Professor Pupin before the Franklin Institute of Philadelphia he told how he arrived at his conclusions which resulted in his simple yet wonderful invention. The first step in his work of studying electrical wave phenomena was by analogy with mechanical phenomena, and the simple apparatus of a rope fastened at one end to a door was the starting point. This rope, shaken by the hand, vibrated in waves, and these wave forms could be plotted, just as heat waves (variations from a normal) can be plotted. So, too, can electrical waves, and, that point being established, it is shown that electrical waves traveling on a wire become attenuated just in the same way that waves on a rope grow less with the distance. Efficient wave propagation is always obtained by selecting as conducting agent a medium of large density. A cotton cord alone would not give this density, but a cord on which pieces of lead are strung at proper intervals would give, by proper arrangement, the greatest wave efficiency, and would vibrate as one rope entirely of lead. Analogy of this mechanical phenomenon with an electrical phenomenon, to secure the greatest electrical efficiency with a small current, gave Professor Pupin the idea of a loaded conductor, in which wire coils as magnetic masses were substituted for the lead in the merely mechanical apparatus. Professor Pupin explained that the electrical construction thus come upon is an application of the high potential system, using small currents. Then, on the application of the invention, he said:

"I don't see why we can't talk to Europe. I don't think it is any more remarkable than to talk to a man in this chair. There are technical difficulties, it is true, but in science technical difficulties don't exist—they are simply questions of time, maybe ten years, maybe less. I don't think, however, that technical difficulties to be met with in this telephonic cable are to be compared with the technical difficulties met with when they laid the first cable."

Prof. Michael Idvorsky Pupin's life has been a romance. He is a native of Servia; his family was of humble station, and he came to this country an ordinary emigrant while a young man, obtaining employment as a masseur in a Turkish-bath establishment in New York city. His leisure time was spent in the gratification of a natural taste for study, particularly mathematics. One of the professors of Columbian university, who was in the habit of patronizing bathrooms in which he was employed, was astonished to discover his masseur engaged in solving an abtruse problem in higher mathematics. Becoming interested in the young man, he obtained for him a scholarship in the university, where Pupin completed his education, and upon taking his degree was appointed a tutor and afterwards a professor of mathematics. In the meantime he married a young lady of wealth and social prominence, who has furnished him means to conduct his experiments. He promises to be the foremost mathematician of his generation.

HOW MICA IS MINED IN NORTH CAROLINA

THE extensive use now being made of mica has called attention to the methods of mining and preparing it for the market. Some of the largest deposits of mica are found in North Carolina, of the colors, amber, white, black and speckled. C. E. Zeek, in The Tradesman, describes it in these words:

To make lucid the manner of mining mica it will be necessary for the reader to know something of the character of the country in which these deposits are found. It is in the hill counties of the state, or rather the mountainous sections. These deposits are not of the same character. The strata of rock, however, is always perpendicular, or nearly so, pitching from north to south, the strata bearing mica being composed of either a soft flint rock with side walls of a bluish gray rock or else composed of kaolin clay in which the mica is bedded, being closely associated with the floating flints. The better quality of mica is that found in the solid flint rocks, where it lies in small deposits called "books."

The methods of mining, until very recently, have been quite crude, for the most part being shaft work, which is necessarily a slow process, and since the veins are fissure veins and the mica cropping at the highest point, the most approved method is drift mining, which enables the workmen to take all the deposit at the lowest level attainable.

The "books" of mica are in various shapes and all sizes from 1 inch square to the enormous size of 9 x 2 feet, a block of this size being mined in Watauga County.

After the mica is taken out of the ground it is split into sheets of moderate thickness so that it can be thoroughly examined as to quality. It is then cut to a pattern of the largest possible size that the quality will allow, after which it is cleaned of all dirt spots, purchasers being particular in this respect; and then it is packed for market.

This until recent years was the whole process of the mica business, but now its uses are manifold, hence the different processes through which it goes are just as manifold. The disk machine is the latest inovation. These disks are such as you see in every telephone and every arc light. Mica being a non-conductor of electricity, its use in such machines as dynamos and motors has become very general.

After all the various "patterns" have been taken from the product of a mine the scrap passes to the mill, where it is ground, and is used for mica roofing, mica axle grease, decorating wall paper, and making insulation for electric wires.

EDISON'S FIRST CHECK

WHEN Thomas Edison completed his model of the now famous "ticker" he submitted it to the president of a telegraph company, who asked him to leave it for examination. Edison was out of money, and his landlady had warned him for the last time. He had decided to ask $5,000 for his invention, says the New York Press, but when the president at the next interview asked his price his courage oozed away, and he faltered out that he would like the company to make an offer.

"How would $40,000 suit you?" said the president.

"What!" exclaimed the young wizard, "all in money?"

"Certainly; you can have it now."

"All right."

A check was drawn and handed over to Edison with these words: "That is a check for $40,000. Go to the bank around the corner and they will give you the money."

At the bank he got into the long line and worked up to the paying teller's window. Then he pushed the check over the sill. The teller saw that it was not endorsed, and pushed it back with fitting remarks, which Edison did not understand, he being even then slightly deaf. He retired crestfallen, and the thought dawned upon him that he had been swindled. He had another scene with his landlady that night and visited the telegraph president the next morning in sheer desperation. He told of his experience at the bank and begged for his money or his model. He was properly identified at the bank, endorsed the check and got his money in big bills.

THE RICHES AND YEARLY INCOME OF POPE LEO

LEO XIII.

A TOPIC of wide interest to the public and no end of speculation to the great majority of readers has been the income of Pope Leo. Antonio Gabriano in special correspondence from Rome to The Public Ledger of Philadelphia throws considerable light on this question, showing the Pope to have one of the largest individual incomes in the world. He says:

If a number of people were asked to name the men in the world who had the largest incomes not one in a dozen would include in the list Leo XIII, Pope of Rome, and yet there are probably few men in the world whose incomes last year amounted to so large a sum as did the Pope's. It is true that no statement of his receipts is given out at the Vatican, but it is very easy to estimate from certain known facts, and gain a fairly accurate idea of the Pontifical budget during the Holy Year. Beside the Pope himself, probably not more than two men know the exact amount of the Papal income. One of these is Cardinal Rampolla, the Papal Secretary of State, and the other Cardinal Mocenni, the man who has the actual handling of the money.

Cardinal Mocenni might, with propriety, be called the Financial Minister of the church, for he it is who has charge of the investment of the large sums which come to the Papal Treasury, and although he has no absolute authority as to the disposition of the money, the Pope himself, with the advice of his Secretary of State, making all final decisions regarding it, all the funds pass through his hands, and he enjoys the rare distinction of living in the Vatican in order that he may exercise direct supervision over the Pope's financial affairs.

While not so old a man as the Holy Father, Cardinal Mocenni is advanced in years, and is physically somewhat feeble. His apartments are on the top floor of the Vatican, immediately over those occupied by Cardinal Rampolla, which, in turn, are directly over the rooms occupied by the Pope. It is not easy for a man approaching 80 years of age to climb upstairs, so when he took possession of his apartments in the Vatican Cardinal Mocenni had an American elevator erected in the Court of St. Damasco, and by its means he reaches his rooms with a minimum of effort. It is the first elevator ever erected in the Vatican, and is used only by the Pope and the Cardinals. It is so placed that carriages can drive direct to its entrance.

Cardinal Mocenni is one of the most popular Cardinals in the Curia. He has lived in Rome for many years, and is in great favor with the populace of the city. The amount of money which he handles for the Pope in ordinary years is enormous, but in 1900, Holy Year, the Papal receipts were increased fully $1,500,000, and the total amount which passed through Cardinal Mocenni's hands was not far from $4,500,000. The greater part of this enormous income is "Peter's Pence." In ordinary years this amounts to about $1,000,000, but the greatly increased interest in the church in Holy Year was responsible for a great increase in the total amount of offerings to this fund. Approximately stated, the Pope's income last year was as follows:

Income from real estate in Italy and abroad	$ 175,000
Income from sums invested in securities, etc	1,200,000
Special donations and gifts	500,000
Peter's Pence	2,500,000
Total	$4,375,000

The expense account of the Holy Father does not nearly approach this sum. It consists principally of salaries of Cardinals, envoys, attendants and household expenses, divided somewhat as follows:

Salaries of Cardinals and envoys	$ 300,000
Vatican guards and gendarmes	79,500
Army officers	10,000
Papal servants	14,500
Prelates in attendance	28,000
Library, museum, galleries, etc	50,000
Household, garden and stable expenses	77,000
Expenses of Secretary of State	60,000
Personal expenses of the Pope	2,500
Repairs at St. Peter's, Rome	150,000
Charities	125,000
Contingent expenditures and losses	23,000
Total	$1,099,000

It will be seen from the above statement that a handsome balance remains in the Papal treasury as a result of the income of the Holy Year. It will be seen that the income of the Pope comes from three different sources:

1. Peter's Pence, which consists of the contributions sent by the faithful in all parts of the world. This great source of revenue was devised by the late Cardinal Manning, of London, after the Pope lost the revenues which came to him when he enjoyed temporal power. Now a special collection is taken in every Catholic church annually for this purpose, the amounts being brought to Rome by each Bishop at the time of his visit ad limina. Millions are thus collected every year, but, as has been said, the amount this past year was greater than in any previous year of Leo XIII's reign.

2. All donations and gifts presented to the Pope for personal use by the people from all quarters of the globe to whom he grants private audience. The income from this source is generally considered the private property of the Pope, and it greatly increases on the occasion of jubilees and special anniversaries.

3. Interest accruing from previous investments. This is a large item and is principally the result of wise investments during the reign of the present Pope. His immediate predecessor, Pius IX, accumulated during the last few years of his reign a sum of about $5,000,000, which he had invested in securities to provide for a need that might arise in the reign of some one or more of his successors. The loss of the temporal power in 1870, with the consequent diminution of the revenues of the Holy See, the uncertainty of the amount of Peter's Pence and the enormous expenses of the Vatican council, during which he had to provide board and traveling expenses for nearly every Bishop in the world, led Pius IX to create this contingent fund for the possible future needs of his successors.

Unfortunately, however, the administration of these millions was then centered in the hands of a single person, Monsignor Folchi, who had carte blanche as regards the selection of the securities and bonds in which they were to be invested. The money was at first wisely invested in gilt-edged securities, but several Italian politicians and speculators talked Monsignor Folchi into selling them in order to place the sum realized into fourth-rate Italian enterprises. The result was that in less than three months the whole five million dollars disappeared in the financial crash which swallowed Crispi and the Banca Romana.

This made Leo XIII realize the necessity of giving the administration of the Papal funds into the hands of several highly trusted members of the Roman court, and he therefore formed a commission of Cardinals to which he entrusted the administration of all the possessions of the Holy See. At the head of

the commission he placed Cardinals Mocenni and Rampolla, and with their co-operation, he started anew in the work of saving money and investing the surplus of the Papal revenues in safe securities for the benefit of his successors.

The daily expenses of the Holy See amount, as shown by the statement above, to about $3,000. This includes the personal expenses of the Pope, the salaries of the Cardinals residing in Curia, the support of the Nuncios and the legations abroad, the running expenses of the Vatican and the charities distributed every year by the Pope in Rome and throughout Italy.

The money that remains of the Papal revenues after paying the expenses of the Holy See, are regularly invested in foreign bonds and securities. Once or twice a year, Monsignor Mery del Val, the Pope's confidential agent, or some highly trusted prelate like Monsignor Stonor, but never an Italian, by the way, is sent to London with the available funds, and they are deposited in the Bank of England in the name of the Pope. The officials of the bank advise the Pope as to the safest and best securities in which to invest the money, and it is usually placed in English and American bonds. Some time ago it was proposed to form an American committee, with Cardinal Gibbons at the head, to receive money to be invested in the name of the Pope, and to place it in American securities, according to the best judgment of its members; but for some reason, the plan, although it had the approval of the Pope, was never carried out.

It is stated on the highest authority that since 1883 Leo XIII has been able to invest some years as high as $3,000,000, and that the annual amount so placed ran much less than $1,000,000. Most of the money rests in British bonds and securities, and the income from them already reaches a very high figure. Owing to the fluctuations of the financial market, American industrial securities, although they pay large dividends, are avoided by those who have the placing of the Pope's money; but a large amount of the invested funds is in American Government bonds, which are in the possession of Cardinal Mocenni.

Very little of Leo XIII's income is ever expended by him upon his own person, in fact, his present hobby is economy, and only a short time ago he greatly astonished his chief gardener by ordering that all the produce and fruit raised in the immense grounds surrounding the Pontifical Palace should be sold in the public market of Rome, so as to obtain the money necessary for their improvement.

In another way the present Pope's expenses are less than were those of his immediate predecessor. When Leo XIII was elected each of the Cardinals received a salary of $4,500 annually from the Vatican. One of his first acts was to issue a decree, providing that only those Cardinals who resided in Curia, and who did not enjoy the revenues of a diocese, were to draw this allowance from the Papal Treasury. Under the present administration many other economical measures have been introduced. The salaries of a great number of prelates have been reduced, the number of Vatican employes greatly diminished, and the contributions for schools and colleges in the Pontifical States and in Rome reduced. For this latter purpose Leo XIII has commanded the more wealthy religious orders to furnish funds. It is for this reason that the Carthusian monks may pay $200,000 a year out of the income which they derive from the sale of the famous Chartreuse for the support of the French College of Santa Clara, in Rome, and the Benedictines have been obliged to build and support at their own expense the new University of St. Anselmo, in the same city.

Leo XIII has certainly succeeded in saving more money than Pius IX left at his death, and it is estimated that at the close of the Holy Year the contingent fund of the Holy See amounted to at least $30,000,000. This immense fortune is carefully protected against any claim that might be advanced by the family of the Pope after his death. This is necessary, for at the death of a Pope it is customary for his nearest blood relations to take possession of all articles of value found in his apartments. Another factor is the Italian Government, which is said to be ready to lay hands upon whatever pontifical property it can, even as it did upon the property of the religious orders.

The Pope has, however, a personal fortune which is derived from the gifts presented personally to him by his admirers. Large additions to his private income are occasionally made by the sale of all precious articles which accumulate from time to time. In 1889, when Leo XIII celebrated his episcopal jubilee, many thousand dollars' worth of jewelry and other precious articles were presented to him and shown to the public at an exhibition in the Vatican. All the magnificent Church vestments, chalices, monstrances, pixes and sacred vessels of silver and gold have since found their way to poor churches and convents, but the numerous articles of jewelry and loose gems have been disposed of by Monsignor Marzolini, the Pope's confidential Secretary, at private sale.

The proceeds of these sales went to increase the private fund of the Holy Father. It was formerly his custom to keep his personal money hidden in a wooden box behind the book shelves in his private study, but not long ago $62,000, which he had placed in this box, mysteriously disappeared. This led the Pope to realize that more modern methods for the care of his money were advisable, and a burglar proof safe, of which he alone knows the combination, has recently been installed in his apartments.

Although only the actual money that comes into the control of the Pope has been mentioned, it does not follow that it represents the whole of his resources. Leo XIII is really the absolute master of all Catholic church property all over the world. In English speaking countries church property in each diocese is held in the name of the Bishop, who has the power to sell, mortgage, exchange or do whatever he wishes with it. However, he dare not do anything without permission from Rome, as he holds his position solely at the pleasure of the Pope, whose hand is actually the controlling one. In Catholic countries like Italy, Spain, France and Austria, ecclesiastical property is generally held in the name of the municipal corporation, but even in such places the Holy Father exercises a power that places him at the real head of affairs. The property of the religious orders is held as a rule in the name of their Generals at Rome, but the Generals can be removed by the Pope, so that in the case of the orders also, the Pope is the real controller of the property. In this way the present Pontiff is the master and practical owner of property worth hundreds of millions of dollars, the legal holders of which he can appoint or remove at his pleasure. It is, therefore, a safe statement that no man in the world controls so vast a property as Leo XIII, and, old man though he is, he wields a financial power that is unsurpassed.

THE STOPPING OF A LOCOMOTIVE

SOME interesting testimony regarding the handling of a locomotive was given by engineers in a recent trial of an accident case at Kansas City, Mo. Among those who testified was "Sandy" Baldridge, who has been an engineer on the Union Pacific thirty-one years, and is known to almost every traveling man on the road. Mr. Baldridge testified that a passenger train going six miles an hour could not be stopped within fewer than from 150 to 175 feet; going 10 to 12 miles an hour, 200 to 225 feet, and at a speed of 18 or 20 miles more than 300 feet would be required.

"It usually takes the length of about six coaches," he said. "The coaches are 52 feet long, so that would be 312 feet. This, of course, is in an emergency, where we are not expecting to make a stop. Where we are anticipating to stop we can make it in shorter time, because we prepare for it. We shut the speed down to about eight miles, say, some time before reaching the stopping-point, may be a mile off, and allow the momentum and the low pressure together to carry the train within a short distance, and then apply the air, when the momentum has about exhausted itself. I begin to stop fully a mile before reaching some stations. Usually, in pulling into Kansas City, I begin to stop one-fourth of a mile away.

"There are various things which prevent an instantaneous stop. In the first place the throttle must be closed. The steam does not cease its work on the same instant that the engineer shuts it off, for the reason that the point at which he shuts it off is 20 feet from the cylinder heads, and a 20-foot pipe, six inches in diameter, full of steam, must empty itself through the cylinder heads before the steam is exhausted. This 20 feet of steam exerts just as high a pressure as any other 20 feet, and works the piston rods for an instant after the throttle is closed.

"In the second place the air brakes, while they are an effective appliance, are not nearly so effective as the general public supposes. The operation of releasing the air, of producing a vacuum, and of opening the valves that finally press the brakeshoes against the wheels, is so complicated that it takes an appreciable moment of time to apply the air. All that the engineer does is to swing a small lever halfway around. This might be done with one hand while the throttle is closed with the other. After that is done, if there is any time left, the sand can be applied, too, but as a usual thing accidents happen so suddenly that the sand is never reached."

THE INTERNATIONAL COURT OF ARBITRATION

THE death of ex-President Harrison recalls the fact that he was a leading member of the highest constituted court in the world, the International Court of Arbitration. The appointment of the members of this court was the direct result of the Czar's peace congress at the Hague last year. So little is really known about those who were chosen, except as the occasional mention was made from time to time in the daily press, that it will doubtless be of considerable interest to readers of Our Day to see a full and explicit statement such as was made recently by a careful writer. He says:

As at present constituted, the court is composed of members appointed by the fifteen signatory powers. By the provisions of the convention, each power might appoint not more than four members. Austria appointed four, Count Frederic Schonborn, Mr. D. De Szilagyi, Count Albert Apponyi, and Mr. Henri Lammasch. The Belgian delegates are Mr. Beernaert, Baron Lamhermant, Chevalier Decamps and Mr. Bolin Jasquemyns. Denmark names only one representative, Prof. L. Matzeen. France has four: M. Leon Bourgeois, M. De La Boulave, Baron Destournelles De Constant and M. Louis Renault. The four from Germany are Mr. Bingner, Mr. Von Frantzius, Mr. Von Martitz and Mr. Von Bar. Great Britain's representatives are Lord Pauncefote, Sir Edward Baldwin Malet, Sir Edward Fry and Prof. John Westlake. The delegation from Italy consists of Count Constantin Nigra, Commander Jean Baptiste Pagano Guaranashelli, Count Tornelli Brusati de Vergano and Commander Joseph Zanardelli. Japan names two delegates, Mr. I. Motono and Mr. H. Willard Denison, and The Netherlands four, Mr. T. M. C. Asser, Mr. F. B. Coninck Liefstring, Mr. A. F. de Savornin Lohman and Mr. G. L. M. H. Ruis de Berenbrouck. Portugal is represented by one member, Count de Macedo; Roumania by four, Mr Theodore Rosetti, Mr. Jean Kalindero, Mr. Eugene Statsco and Mr. Jean N. Lahovari; Russia by a similar number, Count N. V. Mouravieff, Mr. C. P. Pobendonsteff, Mr. E. V. Frisch and Mr. de Martens. Spain names three, the Duke of Tetuan, Mr. Rieviendo Oliver and Dr. Manuel Torres Campos. The kingdoms of Sweden and Norway furnish two names, those of Mr. S. R. D. K. d'Olivecrona and Mr. G. Gram, and the United States delegation consists of ex-President Benjamin Harrison, Chief Justice Melville W. Fuller, Mr. John W. Griggs and Mr. George Gray.

Turkey, Bulgaria, Montenegro, Siam, Switzerland and Persia were not represented at the congress, neither was any Latin-American state, though provision was made for any or all of these to unite with the signatory powers in the treaty and appoint representatives to the court whenever they think proper to do so.

The members of the court are appointed for a term of six years, may be reappointed and for the convenience of smaller states, one person may serve as the representative of several. Thus the Central American states, if they choose to do so, might appoint a single representative in case of death or resignation, the vacancy is filled after the manner of the original appointment.

It is not supposed that members of the court will reside at La Hague, or even go there at all unless called thither on business connected with some international affair that needs to be settled. They are virtually a panel from which a selection of jurors may be made, are all men of the highest reputation and integrity, and many of them fill positions of state in their native countries. The scope of the court's operations is so broad that any matter of international importance, any difference arising between nations, in short, any cause of friction, may be brought before the court for adjudication. When a difference arises, likely to lead to war, provision is made for a peaceful settlement by any one of several different methods. It is specially stipulated that an offer of mediation by a third power shall not be considered an unfriendly act, and if several powers unite in the appeal for peace, the offer shall still be considered as friendly. If the offer be disregarded, the states having a difference may each appoint two representatives, who shall repair at once to La Hague and select an umpire. If unable to agree, the choice may be referred to a third power, and if this method also fails, each of the states interested may name another power, and these two will make final decision concerning the umpire. Contending states, however, may if they prefer another method, select one or more arbitrators from the members of the court, or, if they choose, may designate a sovereign or the head of a state to act as umpire, in which case he determines the procedure of the court.

The place of meeting of the arbitral court thus selected, may be at any convenient point, but unless otherwise designated, the special tribunal will meet at La Hague, where the Dutch Government has purchased the Peace Congress palace for the special use of this exalted tribunal. The parties to the controversy have the right to employ intermediaries or agents to represent them before the tribunal and to engage counselors or lawyers to place their cases properly before the court. Each special tribunal shall decide for itself what languages may be employed in its proceedings. A particular case is divided into two parts, the presentation of evidence and the hearing of argument. The evidence shall consist of any documents, maps, charts or historical matter, having, or supposed to have, a bearing on the case submitted by the parties to the controversy, and the argument will elucidate the evidence and show its bearing and value. All documents submitted by one party shall be made known to the other, the oral hearings will be under the direction of the President, and no publication whatever will be made of the proceedings, save with the consent of both parties.

SECRETARY GAGE POKES THE BEAR

—The Chicago Record

A court of arbitration has the right to exclude, by a majority vote, any evidence which one party wishes to introduce without the consent of the other, and, also, after the evidence is in, to refuse to admit new evidence which one party seeks to introduce without the other's consent. In case new evidence is offered, the tribunal decides upon its pertinence and may, with the consent of both parties, concede its admission. It has the right to require both parties to produce official documents supposed to have a bearing on the case, but should the demand be refused, no attempt at compulsion is made. A simple memorandum of the refusal is entered on the official proceedings. Attorneys and special pleaders are to be allowed all the latitude they desire in the presentation of their cases, they may make objections and take exceptions, but the decision of the court on these points is final. The members of the court may propound any questions they choose to the attorneys, but no questions, answers or observations are to be made matter of record. The tribunal is guided by the general principles of international law, but may, in the consideration of a case, take note of treaties and conventions supposed to have a bearing on it.

The case being closed, the deliberations of the tribunal are held in secret, may extend over any length of time and the conclusion is reached by a vote; the refusal of any member to participate in the voting must be specified and explained. The verdict is in the form of a written opinion signed by each member, though the minority members specify their dissent. It is read at a public session, all the parties to the controversy being present or having been properly notified. The decision is regarded as final, but in case of the discovery of new evidence unknown at the time of the decision and having an important or decisive hearing on the case, either or both parties may request a revision, which the court may grant or not, according to its opinion of the evidence. Decisions are binding only on the parties to the controversy, but should other states be interested in the matter through treaties or conventions with the parties, they also may be allowed to participate by submitting evidence or documents having a bearing on the matter at issue; they may appear or be represented before the

tribunal and should they thus participate, they must abide by the decision. The expense of every court of arbitration is to be borne by the parties in the suit.

This, in brief, is the nature of the scheme prepared by the peace congress of last year, but in order that proper arrangements may always exist for the calling of a special court at any time, an international bureau has been established at La Hague, the clerk's office for the special courts which may, from time to time, be called. The bureau will be the recipient of all the archives of the courts of arbitration, will preserve and care for them, will receive all communications relative to treaties between powers that they choose to furnish, and will preserve certified copies of all arbitration agreements and of the opinions rendered by special tribunals, the signatory powers promising to place with this bureau authenticated copies of all matters presented to a special court.

It is specially stipulated, however, that an appeal to the court shall not interfere with or postpone the mobilization of troops, the concentration of fleets, the movements of supplies or other preparations for war; and also, if hostilities have actually begun, that it shall not stop or delay military operations already advanced. If, however, even after the breaking out of hostilities, the parties are willing, or can be induced to listen to a peaceful appeal, each may choose a friendly power, and during a period of thirty days, direct negotiations between the two will cease; as far as possible, military operations, if begun, will be suspended and the two friendly powers will do what they can to effect a reconciliation. As will be seen, the entire scheme is very liberal. Any power may refuse to accept arbitration and there is no chance of compulsion. Provision is made for powers that have not united in the treaty to receive the benefits of the court, for a non-signatory state may appeal to it against a signatory power, and even two non-signatories may make application for a special tribunal to adjudicate a difference. As one of the judges is reported to have said: "This tribunal, the highest on earth, may not prevent wars, for there are times when nations become so inflamed with passion and national hatred that both may refuse to listen to peaceful suggestions, though all the other powers should unite in an appeal for peace. It offers, however, a method by which, without loss of honor, prestige or credit, any nation may avail itself in averting war and thus appreciably diminishes the opportunities of conflict."

RAPID GROWTH OF MEXICO

THE last statistical annual of Mexico presents some interesting data as to the development and industrial growth of that republic. On the basis of the latest official census, in 1895, the present population is estimated at nearly 13,000,000. There are 556,099 pupils registered in the schools. The schools number 12,358, of which 9,691 are public, supported by an educational budget of $5,980,180 (Mexican), and 2,229 are coeducational. The thirty public and school libraries in the country contain 991,729 volumes.

Facilities of communication grew rapidly in the decade beginning with 1889. Railway mileage increased from 5,406 to 9,044 in this period. The freight and passenger carrying roads, exclusive of mining and street railways, report an increase in 1898—the last year for which statistics are available—of over 100 per cent. in passenger traffic, 200 per cent. in freight traffic, and considerably over 100 per cent. in gross receipts since 1889, the figures being for these respective years 4,108,000 and 8,986,000 passengers, 2,114,000 and 6,090,000 tons of freight, and $17,622,000 and $38,494,000 (Mexican) gross receipts. In the same decade the telegraph mileage increased from 27,862 to 42,271, of which about 33,000 miles are operated by the Government. The present extent of telephone lines is 17,654 miles, slightly over one-fourth of which belong to the public. This is an increase of over 12,500 miles since 1889; 2,288,000 telegraph messages are transmitted annually. Postoffices have increased from 1,212 in 1889 to 1,718 at the beginning of 1899.

There are 118 cotton mills in the republic, with nearly 500,000 spindles, employing 21,960 operatives and producing an annual output valued at $28,242,766 (Mexican). The mines employ 113,883 workers, and in 1898 produced $136,195,766 worth of minerals, an increase of more than $22,000,000 over the previous year. The most valuable agricultural product is corn most of which is consumed at home. Beans and wheat follow in the order named. The respective values of these three crops are $142,408,000, $17,768,000 and $16,509,000. Planters derive a revenue from the manufactured products of sugar cane of nearly $20,000,000 a year. The cotton crop is valued at nearly $7,000,000, and coffee and tobacco at $4,500,000 and $4,000,000, respectively. The only fruit exported to a great extent is oranges, of which the United States took $910,851 worth in 1898.

The condition of the public revenues has steadily improved. In 1889 the receipts of the Federal Government were $54,801,924 and the expenditures $73,922,399. There has been a surplus every year since 1895, and in 1898 the receipts were $53,288,061 and the expenditures $51,815,285. The aggregate receipts and expenditures of the States and Territories of the republic are $18,930,285 and $16,429,908, respectively, and those of the municipalities $15,635,031 and $15,381,670. Only one State shows an expenditure exceeding its revenue.

NEW YORK CITY MAY BECOME a LANDLORD

A MOVEMENT has been started in New York City which may lead the city authorities into a work similar to that which has been undertaken in London on so large a scale. It is the acquirement of a block of ground by the city and the erection of model tenements to be rented to the people at prices which will pay the legal rate of interest on the investment and the cost of proper maintenance. This movement was started by Mr. Alexander Law of the Church Association for the Interests of Labor and has been taken up by the League for Social Service, of which Dr. Josiah Strong is president, and by a number of labor organizations and societies. The New York Sun states that these are now urging the Legislature to enact such legislation as will permit the city to acquire property for the erection of model tenements along the lines described, one of the conditions to be that the city shall at no time rent any of the property for the sale of intoxicating liquors. The benefits which it is asserted would result from the erection of such homes by the city are set forth as follows:

First—Furnish homes for the people who otherwise would never have them.

Second—Furnish employment for our own mechanics, laborers and tradesmen, and thereby benefit the whole community.

Third—Do away with the present unsanitary tenements which are a menace to life and health, it being an undisputed fact that over six thousand deaths a year occur from consumption alone, contracted under conditions the average wage-earner is powerless to protect himself against.

Fourth—By refusing to allow any intoxicating liquors to be sold on such premises we commit the municipality to a line of policy which must in time commend itself to the citizens of the city by checking the causes which lead to demoralization and vice, and as an object lesson show that the municipality stands for the ideals we must strive after if the nation is to survive and prosper, as its ultimate fate must depend to a great extent upon the training the children of our great cities receive, and the environment that always surrounds them.

Fifth—Gradually put in operation a system that will restore to the people the right to live on earth without paying at least one-fourth of all they earn to landlords for what nature intended should be the common heritage of all the people.

REFUSED TO WORK ON SUNDAY

A LITTLE white dog that sits on the music box of a blind man, in Minneapolis, and permits people to drop pennies in a basket tied around his neck by a ribbon, on last Fourth of July refused to attend to business. He snarled and showed his teeth when any attempt was made to put on his uniform. The little fellow frisked and gamboled, tugged at his chain, bit the stump tails of his stray companions, and generally misconducted himself.

The blind man is reported by the editor of Our Dumb Animals, to say that the dog has never been asked to work on Sunday. He thinks that Sunday ought to be a day of rest for blind men and dogs as well as more fortunate beings, so every Sunday the dog gets an extra fine breakfast, consisting of boiled liver, and full liberty to do precisely as he pleases. Thus the little curly dog has come to regard Sunday as a full holiday, and he knows when the day comes around, because on that day his master puts on a white shirt and his best hat. The blind man is patriotic, and so on the Fourth he wore his white shirt and best hat, hence the little white dog thought that it was Sunday and refused to work.

OUR DUTY TO CUBA AND THE PHILIPPINES

COL. TURNER ON CUBA

AMONG those who organized a company for effective service against Spain was Colonel Turner of Chicago. He utters these strong words of protest against the policy of the government which would repudiate our solemn promises to give Cuba absolute independence:

When Congress, in 1898, in the name of the American people, solemnly announced our purpose in entering upon the war against Spain in the following words, viz.: "That the United States hereby disclaims any disposition or intention to exercise sovereignty, jurisdiction or control over said island, except for the pacification thereof, and asserts its determination when that is completed to leave the government and control of the island to its people," I understood, as I believe, did every honest, intelligent citizen, that in case of success we were to make a free gift, without conditions of any kind, of freedom and independence to the Cuban people.

I believed that we were entering upon a great philanthropic, beneficent, wholly disinterested struggle for the liberation of a suffering people.

I believed that our government by that resolution has made a holy and inviolate contract with the nations of the world, with Cuba and with me as a soldier, that as soon as we had driven Spain out of the island and its people had established a government capable of preserving law and order and protecting life and property we would withdraw and leave the people as untrammeled as to their future as we ourselves are.

But that citizen is not "free and independent" whose entire relations with his neighbors are subject to the supervision of a guardian, nor is that country free and untrammeled whose relations with other countries are dictated by a stronger nation.

And as every citizen whose expenditures of his own moneys are subject to the direction of another is a bondman, not a freeman, so is that country a subject nation whose debt-incurring power is limited by another.

And that is but a mockery of independence which makes the right of national self-defence subject to the uncertain intervention of a neighboring power.

We pledged ourselves to give Cuba freedom and independence without money and without price, and yet with a picayunish greed we are demanding as recompense valuable naval and coaling stations and the little Isle of Pines.

By as solemn a pledge as was ever made—made by the light of day—made with a full knowledge of all the sacrifice of blood and treasure which it entailed—made with the free and intelligent concurrence of the entire American people—we promised Cuba a wholly untrammeled national independence, and no amount of casuistry or argument can make the proposed "cribbed and coffined" similitude of freedom anything but the baldest and most dishonorable repudiation.

It may have been, as is claimed, quixotic, it may have been egregious folly to have so bound in chains our ambition and our opportunity for conquest. But if so, it was the sublimest piece of national folly in the world's history. And it was the one absolute vital thing which put the great liberty-loving heart and conscience of the American people solidly behind the war.

But whether it was wisdom or folly, we voluntarily made as solemn, as clear and explicit a compact as human language could embody, and no matter what evils may follow we are bound in honor to make good that promise. If evils and dangers follow let us meet them when they come, not commit a giant wrong to avoid them.

In the name of national truth and honor I protest against any repudiation of the letter or spirit of our obligation.

As a Republican for life, I protest against it. In the name of that party, which I believe means to be true, honorable and faithful to all its promises, I protest against such misrepresentation of the party's wishes and purposes.

I protest against it as one of that great army which gave us possession of Cuba—which enlisted under a people's assurance that we were to fight in a war which should have nothing of gain or self-seeking in it.

I have rejoiced and gloried in my service as the grandest gift in my life in the interest of downtrodden humanity. I protest, therefore, against the violent wrenching of that great war of beneficence into a war of greed and conquest. I protest against the clouding of a soldier's honorable service with the shadow of repudiation and infamy. I protest against turning the glorious, freedom-giving campaign of Santiago into a blacky and unfaithfulness.

OUR DUTY TO THE FILIPINOS

DR. LYMAN ABBOTT has some strong opinions on the Philippine question. Writing in the Philadelphia Times what he thinks the United States should do he says:

First of all, emphatically to declare, as it ought to have done long ago, that every Filipino shall have all the civil and religious rights which we guarantee to citizens of the United States in every territory. Second, that it shall have civil government, and the military subordinate to the civil government, save only where the military arm is absolutely necessary for the preservation of order and the maintenance of peace. Third, that in the government there carried on the Filipino shall have all the rights of self-government which he is capable of exercising, and shall take them just as fast as he is ready to exercise them. And finally, that when the government is thus established, peace is thus restored and opportunity to come at the judgment of the islanders can be had, then by a plebiscite the relation of the United States to that island and the island to the United States shall be determined by conference between these people and our own. For of one thing I am absolutely certain—America will never consent to hold under a yoke of imperial bondage a people able, willing, competent and anxious to be free.

FREE THE FILIPINOS

THE action of Congress in transferring to the executive department of our government all power relating to the "our new possessions" will be resented by many who have followed the tendency of the hour. Congressman McCall in the New England Democrat voices what many believe to be our duty in the Philippines in these words:

It seems to me that the time has arrived when the question of the ultimate relations of this country to the Philippine archipelago should be considered and our position as a nation declared. * * * Those who think that the Filipinos continue to wage against us the war we purchased from Spain because of some speech made by somebody against the treaty have read history to but little purpose, if indeed, they have read it at all. They are inspired by that same unconquerable spirit which is the noblest heritage of the human heart, which I am glad to believe is universal; it is a man's best title to freedom, and that is the spirit to wage unrelenting war in behalf of liberty. The empire of Great Britain never attained a loftier moral stature than when, after Majuba Hill, she showed herself willing to do justice to the Boers.

Standing almost peerless in physical strength among the nations, she displayed the nobler and more essential qualities of greatness when, after a reverse, she yet listened to the demands of that weak little republic in South Africa. That act of Gladstone strengthened his country in the hearts of men the world over, and it will shine in history all the more brightly in contrast with the brutal and merciless policy of extermination which is now shocking the sensibilities of Christendom.

But how much easier is it for us today to pursue a policy of justice? We have suffered no reverse, or none, indeed, unless it be a moral one which our own conduct has inflicted. The organized armies have been dispersed. The Filipino leader whom we bore to Luzon in one of our own ships has been driven by us to the caves of the mountains, if, indeed, he yet lives. The time has come when we should frankly declare to these people our ultimate purpose toward them. Let us give them that assurance which all our history inspires. Let us tell them that we will aid them for one year—for five years, if need be—in setting up a government of their own, which preserves liberty, independence and self-government.

THE ENGINE OF THE FUTURE

CORNELIUS VANDERBILT, the millionaire locomotive expert, in an address to an audience of Yale scientists, said that for speed the engine of the next century was likely to have electricity as the motive power, but that for freighting purposes nothing now in sight will do except the steam engine.

Mr. Vanderbilt is now engaged in a series of experiments relative to the construction of a multitubular boiler. He believes that in its perfection lie the greatest possibilities of the steam engine of the future.

BREAK THE RULES OF CIVILIZED WARFARE

A STATEMENT CONCERNING THE SOUTH AFRICAN WAR

IT has become more or less generally familiar that the British have been carrying on the war with the Boers in an uncivilized manner. The full extent of their culpability however did not become known until recently, when President Steyn and General Dewet made the following official proclamation:

Be it known to all men that the war which has been forced on the Transvaal republics by the British government still rages over South Africa; that all the customs of civilized warfare and also the conventions of Geneva and The Hague are not observed by the enemy, who have not scrupled, contrary to the Geneva convention, to capture doctors and ambulances and deport them in order to prevent our wounded from getting medical assistance; that they have seized ambulance material appertaining thereto; that they have not hesitated to have recourse to primitive rules of warfare, contrary to the solemn agreement of The Hague, to arrest neutrals and deport them and to send out marauding bands to plunder, burn and damage burghers' private property; that they have been continually capturing women and children and old and sickly men, and that there have been many deaths among the women because the so-called Christian enemy had no consideration for women on a sick bed, or whose state of health should have protected them against rough treatment.

Honorable women and tender children have not only been treated roughly, but have been insulted by soldiers by order of their officers. Moreover, old mothers and women have been outraged. Wives and children and the property of prisoners of war have not been respected. In many instances the mother and father have been taken, the house has been left unprotected and all have been left to their fate, an easy prey to savages.

The world has untruthfully been informed by the enemy that they have been obliged to carry out this destruction because the burghers blow up the railway lines, cut the wires and misuse the white flag. Nearly all the houses in the republics have been destroyed, whether in the neighborhood of the railroad or not. The alleged misuse of the white flag is simply a continuance of the everlasting calumny against which the Afrikander has had to strive since the time God brought him in contact with the Englishman. Robbing his opponent of goods only does not satisfy him; he is not satisfied until he has robbed him of his good name also.

They state to the world that the republics are conquered and that only here and there small plundering bands are continuing the strife in an irresponsible manner. This is an untruth. The republics are not conquered. The war is not finished. The burgher forces of the two republics are still led by responsible leaders, as from the commencement of the war, under the supervision of the governments of both republics. The fact of Lord Roberts and Kitchener choosing the term 'marauders' in designating burghers does not make them such. When was the war over? Perhaps after the battles in which irregulars captured the enemy and totally vanquished them. The burghers would be less than men if they allowed the enemy to go unpunished after ill-treating their wives and destroying their homes from sheer lust of destruction. Therefore a portion of the burghers resent it.

Cape Colony will not only wage war, but will be in a position to take reprisals as it has already done. In case of ambulances, therefore, we warn the officers of his majesty's troops that unless they cease the destruction of the property of the republics we shall wreak vengeance by destroying the property of his majesty's subjects who are unkindly disposed. But in order to avoid being misunderstood we hereby openly declare that their wives and children will always be unmolested, in spite of anything done to ours by his majesty's troops. We request nothing from our brothers in the colony, but call on them, as well as on the civilized world, to assist, in behalf of our joint civilization and Christianity, in putting an end to the barbarous manner of the enemy's warfare.

Our prayer will always be that God, our Father, will not desert us in this unrighteous strife. Steyn and Dewet.

TYIPCAL SCENE IN SOUTH AFRICAN REPUBLICS

EYESIGHT OF CITY SOLDIERS

THE increasing range of modern army rifles as contrasted with the narrow limits of the city man has raised a problem in army circles. In the Boer war this is especially notable. Gen. Sir Redvers Buller says:

Many of our men are city born, and England is not a very large country. We went out to a region where the principal number of our enemies were born in a very open country, and it is not untrue to say that practically the vision, the ordinary sight, of our enemy was two miles at least further than the average sight of the English who were fighting against them. That is a matter of actual fact. An ordinary Dutchman or African can see a man coming toward him two miles before the man approaching can detect him."

Lord Wolseley has also stated that when he was in South Africa he was impressed with the same fact, and it has been remarked that the Boers are not so much better shots as better judges of distance than the British soldiers. It is well known that savages or less civilized races living in the open air do not suffer from the imperfect vision resulting from defective accommodation of the eye, which often obtains among more highly civilized and educated races, "whose vision," says the Lancet, "has been accustomed and adapted to more and more limited ranges." The question of artificial light cannot be ignored. In highly civilized communities the wide use of electric light has robbed the night of the restful darkness it used to bring to tired eyes. Night has been turned into day in towns and cities, and the blare in streets keeps the eyes on a strain that is unknown among people who practically go to roost with the chickens. Moreover, the social activities of a highly civilized people call for more and more work by the eyes in brightly lighted halls, theaters and parlors, while the smoke and dust in busy cities are a perpetual menace to the healthy condition of the eyes. Given the same amount of rest and freedom from the strain of artificial illumination, it is a question whether the horizon line would play as large a part in affecting eyesight as it is now credited with.

With the continued growth of cities and the reduction of the country population the question of the eyesight of soldiers will become a question of increasing importance.

MEDICAL EXPERTS ON EVERY DAY TOPICS

SLEEP AND SLEEPLESSNESS

DR. ANDREW WILSON, in a review of a learned paper of Sir James Sawyer, M.D., on sleep and sleeplessness, writes for the London Chronicle in these words:

When the brain cells are carefully studied in their different phases of activity and repose they are seen to undergo certain remarkable changes in shape. The processes or branches thro' which contact is made between one cell and another are seen to be retraced in the resting state, while in activity they are extended. However the changes in question are brought abor we may conclude that it is the switching off of the brain cells from each other and the breaking of the contacts necessary for the carrying of their work which represent the true cause of sleep. Fatigue of the brain cell is thus the dominant note of repose, and the mechanism whereby that repose is secured is seen at work in the retraction of their branches. It is all just like a telephone exchange in this respect, where we find contracts made and broken continually in the active work of the center. At night the connections are practically severed, and such as may be made in the case of the brain exchange carrying on the work of dreaming, they represent the work of the night shift of the brain. If this view of sleep be correct, we see more clearly than ever that our resting period must represent a habit, just as sleeplessness in its essence is a habit of another kind. We break into the cycle of sleep when we suffer from insomnia and substitute another habit for that of repose.

ANTITOXIN FOR DIPHTHERIA

THE Chicago Health Department has made out its report showing the results of the use of antitoxin for diptheria during the past five years.

Five years ago the department undertook the treatment of diphtheria and all-croup with antitoxin. It is largely due to the persistence with which the department urged and practiced the use of the preventive that there are now a larger number of physicians using antitoxin in Chicago than in any other city of the world.

When the department began to use antitoxin the annual average of deaths in the city from diphtheria and all-croup was 1,482. For the five years preceding the undertaking the aggregate of deaths from these causes had been 7,411. The general results attending the undertaking are summed up in the statement that for the five years since that period the aggregate of deaths was 4,309. The annual mortality rate before was 11.23 per 10,000 of population; that of the period following was 5.45 per 10,000 of population. These figures show a reduction in the five-year antitoxin period from the five-year pre-antitoxin period of nearly 42 per cent in the actual number of deaths, and of nearly 52 per cent. in the mortality rate of this class of deaths.

The Health department undertook the treatment of diphtheria among the poor and destitute of the city in October, 1895—among those unable to pay for medical attendance and for whom at the time there was only the provision afforded by the overcrowded wards of the County Hospital. At the close of the five-year period the results show:

Number of cases intubated	585
Number of intubated cases recovered	417
Per cent. recovered	71.29
Per cent. died	28.71
Number treated with immunizing doses	4,831
Number subsequently attacked	25
Per cent. of cases subsequently attacked	0.51

During this period the total number of cases reported was 9,533, of which number 5,982 were bacterially verified as true diphtheria. There were 5,727 cases treated with antitoxin, the remaining 255 either refusing antitoxin or being treated by other physicians, in which cases the results were not known. Of the cases treated by the Health department, 5,338 recovered and 369 died.

"These results are attributed by the department and its inspectors," said the report, "primarily and most importantly to prompt administration of antitoxin in full strength and quality to every case visited that warrants suspicion of diphtheria. In the presence of suspicious symptoms no time is lost—even to secure a bacterial diagnosis—before making the injection. Of hardly less importance is held the early bacterial diagnosis of every case of sore throat visited. Frequently where the clinical symptoms do not yet point to diphtheria the microscope will reveal presence of the bacillus, whereupon an injection of antitoxin is at once administered. This practice of the department will account for the relatively large proportion of cases recorded as treated on the first or second days of the disease, while the prompt administration of full doses accounts equally well for the low death rate among cases thus early treated."

COLDS DUE TO NERVOUS EXHAUSTION

THERE has been a noteworthy change of medical opinion in recent years as to the subject of taking cold says a medical authority in the Philadelphia Record. It is a popular idea that if one be amply provided with warm clothing, wraps, a mackintosh, rubbers and an umbrella, little risk is run of taking a cold; yet it is a matter of frequent experience that, in spite of all reasonable precautions, a catarrhal affection may be developed or pneumonia set in. The fact that weariness, depression of spirits, fright, anxiety or something which has affected the nervous system unfavorably has preceded the attack is frequently overlooked. When free from every form of nervous debility a person may expose himself to draughts, dampness and other usual causes of colds and escape entirely, while at another time, when weary or depressed from any cause, he may become the victim of a fatal attack of pneumonia from a much slighter exposure. The nervous origin of colds seems to be recognized by all physicians who have made a special study of acute diseases of the lungs and throat.

It is explained that the temperature of the body is maintained by the nervous system, and that the least failure or relaxation of nervous energy causes a change of the bodily heat and impairs the power of the body to resist the approach of disease. It is a wonderful fact that under any change of outside temperature (even if one go from the arctic regions to the equator) the heat of the body remains at about 98 degrees. But for its regulation by the nervous system the heat of the body could not remain constant, as every muscular exertion would raise the temperature. While warm clothing and all the common means of protecting the body are important, it is even more important to avoid needless exposure if the nervous system be not in its best condition.

DANGER IN ANÆSTHETICS

THE use of ordinary anaesthetics in medical operations has resulted in so many deaths that new forms are constantly sought after. According to statistics, after making allowance for the care in determining whether or not a person is a fit subject for the drugs, it has been shown that one person in every 3,000 will die from the use of chloroform before operation, while from ether only one in 16,000 will die.

Reports from the United States are incomplete, but in England in 1899 there were eighty-three inquests held upon the bodies of persons who had died from anaesthesia, and of these persons sixty-eight died before operation was begun. Dr. James Edmunds, commenting upon these figures for Great Britain, refers to the fact that the disposition to suppress such occurrences might point to 200 deaths annually in Great Britain. This number, too, has been increasing steadily.

Comparing the figures of England with those of India, Dr. Arthur Neve says that while the number of deaths in Great Britain constantly grows larger the fatalities in India from anaesthetics is only one in 26,000 cases.

Climatic differences are supposed to account for the difference in these figures. In general a warm climate is more conducive to the successful administration of chloroform than is a cold one. Anaesthetics in general are more successfully given in southern China than in the northern half of that country.

HOW THE STOMACH IS PHOTOGRAPHED

IT has long been the desire of surgeons to avoid the use of the knife in learning the condition of the stomach. This is now possible through the process of photographing every corner of it. The Practical Druggist says:

Doctors have succeeded in taking photographs of the mu-

cous membrane of the stomach in the living subject. A stomach tube, sixty-six centimeters long, with a diameter of eleven millimeters, is introduced, having at the lower end an electric lamp and at the upper end a camera. The stomach is first emptied and washed, and then distended with air. Then fifty pictures can be taken in rapid succession in from ten to fifteen minutes. By turning the apparatus on its own axis all parts of the mucous membrane can be pictured. The photographs are about the size of a cherry stone, but, of course, they can be enlarged to any extent.

CHEMICAL EMPLOYES and THEIR DANGERS

THE dangers of acquiring the drug habit in an operation or through patent medicines is well-known, but it is not a generally familiar fact that many of the employes of the large chemical manufactories are hopelessly addicted to the drugs they handle. Chambers Journal refers to this by saying that the greatest temptation, and the most insidious, the most terrible, and yet the most inconsequent, is that which assails young people who are employed in the large chemical manufactories, where they have daily to handle such dangerous medicines as opium and morphine, cocaine, chlorodyne, and chloroform. Too often they become habitual drug-takers.

In order, for instance, to extract the potent principle from many vegetable substances—such as the leaves, bark, seeds, or roots of plants used in pharmacy—it is necessary to use large quantities of chloroform. The popular idea of chloroform, derived chiefly from novels, is that its smell is sufficient to produce instant insensibility. This is, of course, absolutely erroneous. Chloroform, as a matter of fact, is a heavy, sweet-smelling liquid, somewhat hot and sweet to the taste. Apply a bottle of chloroform to your nose as you would a bottle of salts, and your first feeling is one of a certain exhilaration. Continue the process a little longer, and your head swims under the effects of intoxication; but the effect is not very lasting. Now, it often happens that a person who is daily engaged in using this liquid in bulk accidentally inhales some of the vapour. The peculiar mental exhilaration which is experienced leads the victim to do by design what he first did by accident. The habit of intentional inhalation is speedily acquired; then follows the irresistible craving for the illicit solace of the drug, and at length, in order to ensure its full enjoyment without interfering with his daily work, the victim becomes a thief. At first he only purloins a small quantity, which in time is increased to a large amount; and night after night, with soaked handkerchief to his face, he sinks into a deep chloroform-induced sleep. The physical and moral misery caused by the habit is untold, and there is an ever-present danger from the fact that chloroform induces vomiting, and vomiting in the case of an unconscious person means choking to death.

Many a victim of a drug-poison which is slowly corroding all that is best in him, physically and morally, can trace his deadly habit to that unfortunate day when he began indiscriminate tasting, when he first ate of the tree of knowledge, and lost forever the paradise of those to whom is still vouchsafed the mens sana in corpore sano.

AN EXPERT ON ELECTRIC LOCOMOTIVES

A RECENT paper by Mr. Edward H. Tyler, published in Engineering, advocates the electric locomotive, and brings forward some excellent arguments in its favour. Mr. Tyler examines the subject entirely on its merits, and states the subject in the following classification:

1. The problem of applying sufficient power to heavy trains with high acceleration.
2. The question of economy, by reducing the total weight of train and locomotive.
3. The subdivision of trains into self-propelling units.
4. The possibility of being able to control the trains from either end.

That these factors will vary in relative importance, according to the circumstances of the railway to which they apply, is obvious. There are, besides the above-mentioned factors, general considerations depending on convenience rather than on essentials; and as these will vary in every case, it seems clear that a decision as to the best system to adopt can only be arrived at after an examination of all the circumstances. The alternative methods of electric haulage may be classed as follows:

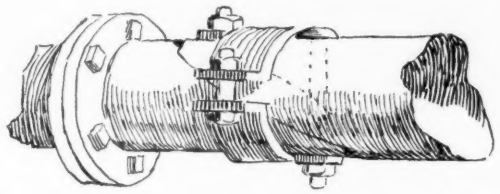
1. By locomotives.
2. By motor-coaches at each end of the train, the leading motor-coach hauling the train, and the end coach trailing, or both ends working.
4. By independently driven axles throughout the train, each unit having its own controllers, which are actuated from master-controllers from either end of the train.

So far, the locomotive system holds the field in almost every case where electric train haulage has taken the place of steam. That is to say, for trains of 100 tons and upwards. It is only fair to say that the system has been rather imposed than chosen. The feature of railways, as distinct from tramways, is that each company is merged in one vast network of lines, over which neighboring companies run their rolling stock, without regard to the limits of their own systems. It follows that, pending the universal adoption of electric traction, which is not even in sight, the service will be a mixed one, and it will be necessary to handle the ordinary rolling stock of any company possessing running powers. The only means of applying electric traction to this influx of through trains is by electric locomotives. The electric locomotive, therefore, has its reason for existence, and in spite of the competition of other more loudly voiced methods is not likely to be superseded for many years.

MENDING A BROKEN SHAFT AT SEA

IT has often been the inquiry of travelers, what would be done if the great shaft which serves to propel the ships at sea should break. In the case of the twin screw propeller the answer is easily given, "set the other shaft at work." But in the case of the single shaft breaking the situation is very different. The Scientific American tells of an instance in these words:

On the 12th of December last, at three o'clock in the afternoon, the Danish steamer "Louisiana" was in the Gulf of Mexico, about sixty miles from the mouth of the Mississippi river, loaded with a full cargo for Aarhus, Denmark, when suddenly the first intermediate shaft broke completely through and the engines commenced to race violently. On stopping the engines it was found that the accident had happened within the shaft tunnel, a diagonal fracture 28 inches in length having occurred in the first intermediate shaft. The gland-bush in the watertight partition, and the foremost bearing, were found to have



been demolished, as well as the head of the second bearing. On examining the shaft, which measured 11¼ inches in diameter, it was found that only one-quarter of its length was intact.

Repairs were started at four o'clock, one hour after the accident, the first work to be done consisting in boring two 1½-inch holes through the fracture, one near each end, the engine-room force being also set to work at the same time forging the special tools required for the repairs. To hold the broken ends together two band-rings were taken from the hoisting gear and clamped around the shaft, and in order to get rid of the vibration from the propeller the tail-end shaft was disconnected. It took 39 hours altogether to complete the boring of the two 1½-inche holes. During the boring a band was taken from the foremast of the steamer and forged into a collar 1½ inches thick by 6 inches in width, and of the diameter of the shaft. As soon as the holes had been bored to 1½ inches, work was started on enlarging them to a diameter of 2¼ inches, and two bolts were taken from the main bearing, cut down to length and bolted through the shafts, as shown in the drawing. The forged collar was then fitted on and Babbitt-metal was poured into the joint. The first bearing box was replaced by a wooden one, and the tail-end shaft and the repaired intermediate shaft were then connected up. The repairs were completed at one p. m. on the 17th, the chief engineer and his assistants having worked continuously day and night for nearly five days. At three p. m. the vessel started at slow speed and reached the lightship at the South Pass of the Mississippi six hours later, where she anchored until she was picked up by a tugboat and taken into the river. The greatest credit is due to Capt. Jensen and the engineer staff for the pluck and resourcefulness shown in the carrying out of such a repair job at sea.

THE PRACTICAL SIDE OF EARTHQUAKE STUDY

PROF. JOHN MILNE, F. R. S., F. G. S., in an authorized interview by the New York Independent, gives some information relating to the study of earthquakes and the seismograph, which is of high value. Among other things he calls attention to the manner of counteracting the effect of earthquakes in Japan:

In earthquake countries like Japan the Government takes an active interest in seismology. It has a course in the Imperial University for the study of earthquakes, over which a professor of seismology presides. It has established hundreds of stations for the observation of earth movements, and is constantly experimenting as to methods of construction that will best resist earthquake shocks. It is now making a seismic survey of the whole empire. It is impelled to do this by the disasters the country has been subject to from time immemorial.

Japan has systematized the lessons she has learned in studying earthquakes, and the knowledge, in the shape of rules and formula, has been of great service to engineers and builders in all countries subject to shocks. Chimneys, walls, dwelling houses, bridges, railway embankments and reservoirs are in better shape now than otherwise they would be. In the case of chimneys steel bands are so wound inside the body of the brick work as to give to the structure something like the elasticity of a metallic rod. So constructed chimneys will sway through a considerable arc without breaking. Another thing for chimneys, which applies to bridge piers also, is to have them very massive at the base.

Builders pay especial attention to doorways and windows now. They make the doorposts and lintels particularly strong. A doorway is a good place to stop in during a shock, for a substantial lintel is a protection. It is well to avoid having the windows directly one above the other in a perpendicular line. The windows may be compared to the perforations in a sheet of postage stamps, and an earthquake is likely to tear through them. Still when it is awkward to arrange windows otherwise the lintels should be strong and bound with rods. It is a good plan also to dig a ditch 10 or 12 feet deep round a building. This shuts off surface undulations, which travel from the center of disturbance much as ripples run along the surface of a pond into which one throws a stone. When the undulations reach the ditch they cease, for there is nothing there to undulate. An earthquake minus the quake does not leave much that is dangerous. There is a good example of the usefulness of this ditch in the College of Engineering on the Imperial University grounds in Tokio. There is an open area all the way round this building, while a stone's throw away from it is the Literary College ditchless. The walls of the Literary College have many fissures, while those of the Engineering College are intact. In building railway embankments, and also the embankments and partitions of water works, engineers have learned much from seismology. Embankments on the shingle-crib plan are far less likely to slip than were the old forms. Indeed, they have withstood violent shocks, whereas the old ones fell, causing much loss of property and life. Reservoir partitions had a bad way of slipping, too, and entailed endless expense and labor in keeping them in repair. Now engineers make them much heavier, and have comparatively little trouble with them.

House builders in countries liable to disturbance have improved upon the old square frame style. Square frames are suitable on stable foundations, but they are just the kind to go to pieces when the ground shakes. In Japan architects have had success with triangular shaped frames, inverted V's, that look at first as though they were merely the outlines for a roof. Only the upper part of the inverted V is for the roof, however. The walls of the house are within the frame, with the ridge pole joining the apexes of the V's. The verandas on opposite sides of the house take up those parts of the V frame that are beyond the walls and hide what otherwise might be rather unsightly.

Large earthquakes can be recorded with the modern instruments at the antipodes of their origins, or at any other part of the world. Therefore seismic observations can locate disturbances in such far away places as the islands off the coast of Alaska, from many of which there is practically no means of communication with the rest of the world, unless a vessel chances by. Reports from three or four observatories will fix the place of disturbance accurately. Each report gives the astronomical time at which the vibration of the seismic disturbance reached the observatory. There should be three sets of these vibrations; two for the surface undulations, which travel from the center of disturbance round the world in opposite directions; one reaching the observatory from the east, say, and the other from the west; or one from the northeast and the other from the southwest. The third will come thro' the earth along a line that will be approximately a chord of the arc on the earth's surface (a great circle arc) connecting the center of disturbance with the observatory. If the surface vibrations arrive from opposite directions at the same time it indicates a center just half way round from the observatory. And the observer can form some conclusion as to the location from his experience, for he knows what centers are at given time-distance, away. In fact, a comparison of the time-distances from three stations remote from each other would often determine the location of a center quite satisfactorily, and a warning from the seismograph may give opportunity to send relief to a stricken and isolated district in time to save many lives. Seismograph records reported a great disturbance off the coast of Alaska not long since, and investigation showed an island had gone down. An inference is that there is a deep depression not far out to sea, one that is not on the charts as yet. The seismograph has increased our knowledge of the condition of the interior of the earth. We knew something of its density and its temperature, but whether it had the characteristics of fluids we meet with on the surface of the earth we did not know. The seismograph has settled this. Its records enable us to determine the average rate of speed at which vibrations travel through the earth. This rate is much greater than vibrations travel through any known metal. It is about two and a half times the rate for glass. Therefore one may say that the interior of the earth is more rigid than anything at its surface. It behaves like the most solid of all solids.

THE BEAR'S ULTIMATUM TO UNCLE SAM.
"If you won't take my beet sugar I don't want your locomotives."

WORK OF THE SOCIAL SETTLEMENTS

THE Social Settlement idea is expanding more rapidly than almost any form of humanitarian effort at the present time. When Toynbee Hall was opened in London in 1885 it stood alone. Two years later the first Social Settlement, a modest little neighborhood guild, was opened in New York by Dr. Coit, the first in America. It was not until 1889 that the famous College Settlement of Rivington Street, New York, and Hull House, Chicago, were opened. But in the past twelve years the growth of the movement has been rapid. A writer in the New York Sun calling attention to these facts says that social settlements are no longer confined to England and the United States, but that Paris has a settlement, also Berlin and Amsterdam. Even in far-off India, in Bombay, there is a settlement. Tokio in Japan has a settlement, and Kioto with the House of Neighborly Love sounds the settlement watchword. Charity is not the ob-

ject of these settlements, but neighborliness. Charity condescends, neighborliness never. This friendly spirit finds various methods of expressing itself, according to the locality and the size of the settlement. There are twenty-eight now in New York, and no two do exactly the same work. Hartley House, for instance, pays special attention to bettering the homes in its neighborhood and offers instruction in domestic economy, kitchen gardening, sewing and cooking lessons given in the tenements themselves. The church settlements emphasize the religious side of the work more or less strongly. Nurses' settlements send professional nurses to take care of the poor sick in the neighborhood and provide lessons in nursing as well as work along the usual lines.

The University Settlement in its work aims particularly to reach the independent poor; those who have enough to eat perhaps, such as it is, but who are starved in every other way. The new building at 184 Eldridge street, New York, has the best equipment of any settlement in the country. Besides the gymnasium, clubrooms, assembly hall, library and reading rooms, it has a system of baths as a result of which 550 people are clean one day out of seven. In pleasant weather the roof garden at the top of the house is opened to the public.

The attempt to make life brighter and happier for the individual is only part of the work undertaken by the University Settlement or any other worthy of its name. But it is the part which the old-fashioned charity giver unversed in the new gospel of brotherly love cannot for the life of him understand. Since spiritual improvement cannot be marked off on a yardstick the settlement worker will find the advocate of the old method hard to convert. A typical day at some of the settlements would be something like this: In the morning the kindergarten gathers in a host of children and makes life merry for them until the clock strikes 12. In the afternoon there is kitchen garden, or cooking classes, where little Rachel and Rebecca learn how to sweep and dust and set the table, and do all the things that a good housewife should know—knowledge which they put to good use in tiny tenement kitchens where the nicety of life is usually neglected.

Then there are clubs innumerable, which among them serve to provide for every age and ambition. History clubs, literature clubs, a whist club, a law club, a naturalists club, an endeavor club, and a neighborhood civic club, are only a few of the intellectual organizations that meet from day to day in the Settlement. Musical societies and a choral union appeal to another set of tastes and the gymnasium is still another.

A circulating library furnishes books to those who want them, and a large, cheerful reading room provided with papers and magazines furnishes a possible substitute for the saloon, when boys and men have a leisure hour. A model pawnshop in connection with the settlement has proved one of the most helpful institutions to the people about. Only 1 per cent. per month is charged, instead of the usual 3 per cent. The Legal Aid Society, which has a room in the settlement, has been invaluable to the foreign-born population of the district, and many a desperate man caught in the meshes of a law which he could not understand has been helped out of his difficulties by his society. Settlement work is not blind nor haphazard. It calls for the scientific spirit as surely as any other problem, and the good settlement worker does not rest until underlying principles are discovered. The special investigations made by the workers of the settlements have included in the last two or three years a thorough study of the pawnshops, sweat shops, bake shops, and tenement houses in the district, also the problem of the un-employed, and a careful study of the dispossessed tenants question.

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THE DEVELOPMENT OF TWO IMPORTANT INDUSTRIES

THE AMERICAN SILK INDUSTRY

ONE of the leading French trade papers last month admitted that the consumption of raw silk in the United States had for three years exceeded that of France. The producing power of this country which has equalled that of France since 1897, now surpasses it and French silk manufacturers do not expect to be able to regain their supremacy in the annual output of silk goods.

According to the New York Sun, foreign manufacturers are keenly sensible of the loss they have incurred through our silk mills, which now produce most of the silks this country consumes. They say they cannot pay the high duties our tariff imposes and compete with our mills. Many of them are attempting to repair their ill fortune in a way which may surprise most of our people. A number of German, French and Swiss manufacturers have come to America and built mills here to compete on our own soil for a part of our trade. They are not confining this policy to the United States. New silk mills built by Swiss manufacturers, for example, are now found in Germany, Italy and France as well as in America. France still claims to head the list of producers but to make the claim good her statisticians have to include the silk mills erected by French capital in foreign countries.

The future prospects of the silk trade seem bright. The industry is growing and extending and more people now wear silk than ever before. Our own prospects will be greatly improved when we sell our silk wares abroad instead of depending upon the home market for practically all our trade. Foreign manufacturers expect to see our goods invading their home markets. A short time ago one of the leading silk men of Lyons and St. Etienne told Consul Brunot that the day was not far distant when American manufacturers would sell silk piece goods and ribbons in Paris and London, not only at lower prices, but also of better quality than France is now able to produce. Thus even the French manufacturers, with all the prestige their fine wares have given them, really expect fierce competition from American goods, though our young industry has reached large developments only within the past few years.

GERMANY GROWS RUBBER TREES

AMONG the steps towards commercial independence, the entrance of Germany into the rubber trade is a notable step. Wolfgang Voltz, a special German correspondent of The Chicago Record, writes:

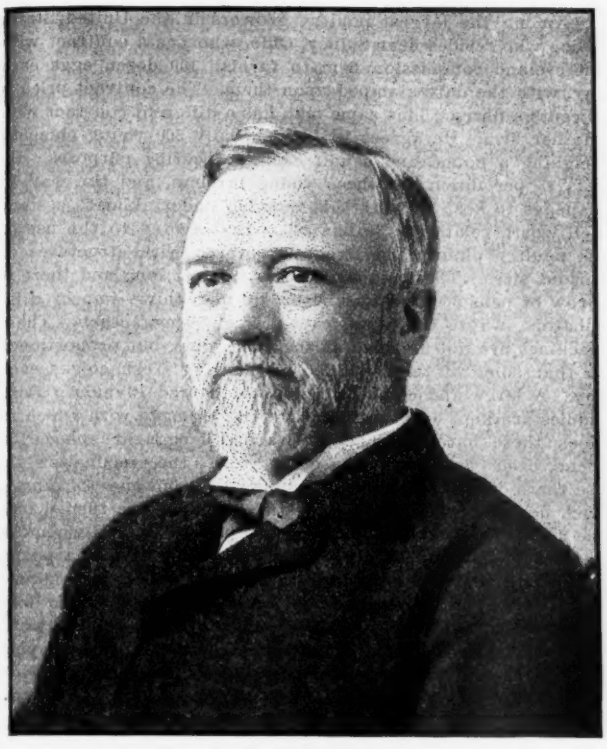
As a consumer of caoutchouc Germany ranks far below either the United States or Great Britain. The German rubber imports are at present barely two-fifths of those of the two countries named. They aggregate in round numbers $12,000,000. However, the consumption is rapidly increasing. Both the growing demand for general industrial purposes, as also the great cable system, the establishment of which Germany is contemplating, will soon make the empire a consumer quite as large as the two English-speaking countries.

But Germany does not propose to continue paying annually to foreign countries 50,000,000 marks ($11,900,000) and upward. A well-defined plan to divorce the fatherland economically from other countries is being manifested in the systematic culture of the rubber tree in the German African colonies. As a result the caoutchouc production in Togoland, Cameroon and German East Africa is increasing from year to year. At present it is in round numbers 2,250,000 pounds, representing a value of about $800,000. The plantation companies are receiving all possible encouragement from the colonial office at Berlin to plant or enlarge their rubber-tree forests, while the botanical department of the oriental seminary at the German capital is giving material scientific assistance.

In German East Africa the culture of the rubber tree is now well established in the south and in Tanga district. Of late the plantation companies in the north, at the foot of the Kilimandjaro have also taken up the matter and extensive tracts of land are now being planted with young trees. In the Cameroon colony the production gives hope for as profitable a field as the Congo state has proved to be. This is due especially to the recent discovery of a tree which gives the so-called "silk rubber." The increase during the last over the previous year has been fully 50 per cent. and is now larger than the production of Togoland and German East Africa combined.

As a consumer of caoutchouc the United States leads all other countries. The last available figures show that the American market absorbed of the world's total production, which was 104,600,900 pounds, nearly 50 per cent—49,882,800 pounds. Next in importance comes England with 40,084,000 pounds, of which Liverpool took about three-fourths, the balance going to London. Antwerp and Havre are about equal in importance as caoutchouc markets; the former took 7,486,300, the latter 6,670,400 pounds.

MR. CARNEGIE'S PRINCELY GIFT TO EMPLOYES



ANDREW CARNEGIE

PERHAPS the largest single individual gift for the benefit of employes ever made was that of $5,000,000 by Andrew Carnegie on his retirement from business and just before his departure for Skibo Castle in Scotland. The total of Mr. Carnegie's benefactions are so large, that, while he may never die poor, he is, however, proving that when he wrote "The Gospel of Wealth" some years ago he meant to carry out the sentiments expressed. A special correspondent of The Chicago Record in New York has made out a synopsis of Mr. Carnegie's gifts to date as follows:

Trust fund for pensions for Carnegie workmen	$4,000,000
Trust fund for free libraries in Homestead, Braddock and Duquesne, Pa.	1,000,000
Educational institutions in America	7,105,000
Carnegie libraries in American cities	7,136,000
Libraries and schools in Great Britain	1,235,665
Miscellaneous gifts	4,428,200
Total	$24,904,865

Other statements differ from this. The Chicago Times-Herald estimates his total contributions for libraries and other purposes at more than $27,000,000. Extracts from the letter written by Mr. Carnegie in making his $5,000,000 gift are as follows:

The income of $1,000,000 is to be spent in maintaining the libraries built by me in Braddock, Homestead and Duquesne. I have been giving the interest of $250,000 to each of these libraries hitherto, and this will give a revenue of $50,000 hereafter for the three. The income of the other $4,000,000 is to be applied: (1). To provide for employes of the Carnegie Company in all its works, mines, railways, shops, etc., injured in its service, and for those dependent upon such employes as are killed. (2). To provide small pensions or aids to such employes as, after long and creditable service, through exceptional circumstances, need such help in their old age and who make a good use of it. Should these uses not require all of the revenue and a surplus of $200,000 be left after ten years' operation, then for all over this workmen in mills other than the Carnegie Company in Allegheny County shall become eligible for participation in the fund, the mills nearest the works of the Carnegie Steel Company being first embraced. This fund is not intended to be used as a substitute for what the company has been in the habit of doing in such cases—far from it. It is intended to go still farther and give to the injured or their families, or to employes who are needy in old age through no fault of their own, some provision against want as long as needed, or until young children can become self-supporting.

Your president and myself have been conferring for some time past as to the possibility of introducing a pension and beneficial system to which employes contribute, resembling that so admirably established by the Pennsylvania and Baltimore and Ohio railroads. We find it a difficult problem to adjust to a manufacturing concern, but should it be solved hereafter the trustees have authority to make this fund the foundation of such a system.

Each superintendent will report to the president such cases in his department as he thinks worthy of aid from the fund, and the president will in turn report to the directors with his recommendation for action.

A report to be made at the end of each year, giving an account of the fund and its distribution shall be published in two papers in Pittsburg, and copies posted freely at the several works that every employe may know what is being done. Publicity in this manner will, I am sure, have a beneficial effect.

I make this first use of surplus wealth upon retiring from business as an acknowledgment of the deep debt which I owe to the workmen who have contributed so greatly to my success.

I hope the cordial relations which exist between employers and employes throughout all the Carnegie Company works may never be disturbed, both employers and employed remembering what I said in my last speech to the men at Homestead: 'Labor, capital and business ability are the three legs of a three-legged stool. Neither is first, neither is second, neither is third. There is no precedence, all being equally necessary. He who would sow discord among the three is an enemy to all.'

The fathers in olden days taught that a man should have time before the end of his career for the 'making of his soul.' I have always felt that old age should be spent not as the Scotch say, in 'making mickle mair,' but in making a good use of what has been acquired, and I hope my friends of Pittsburg will approve of my action in retiring while still in full health and vigor, and I can reasonably expect many years for usefulness in fields which have other than personal aims.

Among the measures taken by the company to aid employes to which Mr. Carnegie refers is the savings fund established by the company fifteen years ago for the benefit of its employes. In this latter fund nearly $2,000,000 of the employes' savings is on deposit, upon which the company by contract pays 6 per cent. and loans money to the workmen to build their own homes.

FIRST AMERICAN FLOUR MILL IN CHINA

THE industrial energy of foreign promoters is breaking up many of the customs of China and in time will undoubtedly transform that country into a great manufacturing nation. The latest step taken in this direction is the manufacture of flour by the most approved modern applicances. The American Consul, Henry B. Miller, at Changking, describes the new industry and adds some observations on Chinese customs which have heretofore proved stumbling blocks in the way of industrial progress:

The increasing production of wheat in this part of China and the corresponding rise of a new industry is undoubtedly one of the sings of the advance of Western ideas among the Chinese people. In the center of the great rice-growing region, it is not a little astonishing to find that Chinese enterprise has seized so promptly on wheat as an article of food. The idea of the promoters of the flourishing and beautifully constructed Fou Foong flour mill, beyond the end of the Markham road, is, of course, to supply the foreign communities of Northern China with flour which fully equals in quality the imported article. The Fou Foong is the first modern American flour mill in China, and has been fitted up by the Edward P. Allis company of Milwaukee, under the personal supervision of that company's representative, Mr. F. G. Morse of Minneapolis. Its location is on the Shanghai bank of the Soochow Creek. It is a four-story stone and brick building of very pleasing exterior and thoroughly American in appearance and style. The main building is 72 feet long and 40 feet wide. A separate house, 40x40 feet, with two large godowns and a handsome,

commodious structure alongside for the manager and head miller, completes the building equipment. The appliances for the numerous processes through which the wheat passes until it emerges in snowy flour are of the most modern description. The mill has 8,000 bushels capacity, and can easily turn out 1,200 sacks of flour of 50 pounds per sack per day.

The entire mill was erected by Mr. Morse with only unskilled coolie labor to help him. The flour turned out is of splendid quality, and we have not seen better or whiter bread than that made from the 'Fou Foong' flour. The bran is sold for $20 Mexican ($10 in United States currency) per ton, and goes to Japan to be used as a fertilizer. Common help is paid from $7 to $10 Mexican ($3.50 to $5 United States currency) per month; engineers are paid from $15 to $30 ($7.50 to $15 United States currency).

The company is entirely Chinese, with a fully paid-up capital of 200,000 taels ($134,000), almost all of which has been expended upon plant and buildings. The Chinese are usually quite ready to furnish capital for enterprises that show an opportunity for profitable investment, and the money for the building and equipment of these mills was supplied wholly by Chinese. The company is so well pleased with this investment that it is planning the erection of permanent warehouses for storing grain at various points in China. It has also in contemplation extensive additions to this plant with a view of increasing its capacity to 1200 barrels per day.

There are two strong Chinese characteristics that are seriously detrimental to the successful management of large industrial institutions exclusively by Chinese. The first and most important is the family or clan social and industrial system of China. Every Chinese manager of any institution employing labor must provide employment for his father, uncle, grandfather, innumerable cousins, and entire clan relationship. These people do not work, are not expected to work, but are pensioners; and their great number makes a burden so heavy that the enterprise becomes unprofitable. This has been the cause of many institutions of a foreign character under exclusively Chinese management being failures, and is largely accountable for the extra cost of products of all factories, arsenals, etc., operated by the Chinese authorities.

There is no country where so many unnecessary people are clustered about industrial works, drawing pay and giving no economic value in return, as in China. The main thought in Chinese economy seems to be to find a place for a man to get wages, however small, regardless of whether he earns it or not. The idea that a man should be employed on the basis of his earning power and capacity is unknown. The other characteristic is lack of organizing and directing power of the Chinese mind applied to industry. There is the most complete liberty and democracy of management of all industrial affairs on the part of the Chinese, with no organized systematic direction. In moving heavy weights, there is no overseer, no manager, but each coolie has a say, and a stranger passing along can give direction without creating offense. Their entire industrial life has been so completely confined to hand labor and single-handed effort that the organizing and directing powers of the mind have not been brought into action.

These two characteristics make it absolutely essential that foreigners must inaugurate, develop and direct for a long time to come the modern industrial affairs of China, even when resting upon Chinese capital. The purely commercial side of the growing industries of China will be handled better by the Chinese themselves. The mechanical, the economic, the distinctly industrial part of all progressive movements in China must be under the direction of foreigners.

FORTUNES IN THE POULTRY INDUSTRY

IT is well for that colossal organizer of capital, J. P. Morgan, that he does not attempt to get control of the poultry industry. The government has been taking an inventory of this source of national income and discovers that there are at a rough estimate about 350,000,000 chickens in the United States. They produce each year something like 14,000,000,000 eggs, which represent $175,000,000. About $130,000,000 worth of poultry is eaten in the country during a year, and the value of the living hens, at 30 cents apiece, is figured at $150,000,000. So the hen stands for about $455,000,000 in the yearly economics of the United States.

The United States exports large quantities of eggs to the West Indies and South America, and even sends them as far afield as South Africa, but France, Russia, Belgium and Denmark practically supply the European market. England, oddly enough, produces few eggs and imports yearly more than 1,300,000,000 from the continent.

Among the largest poultry growers in the United States is one who resides near Sidney, Ohio, who has a contract with a Cleveland commission firm to furnish 100 dozen eggs each day, with the date stamped upon them. The contract price is 20 cents a dozen. This same man has a different contract with another firm. He agrees to furnish daily 300 young chickens weighing a pound and a half each, for eating purposes. He gets $3 per dozen for these young broilers, and the way he manages to keep up with this very big undertaking is a story well worth relating. He has 140 acres devoted to the use of his poultry plant. This tract is covered with structures of various sizes. The main building is 480 feet long and there is a row of pens 560 feet in length. He uses thirty improved incubators, whose individual capacity is 300 eggs each. These machines are not all filled at the same time, but proportioned so that some of them will be discharging fresh chicks each day. A large and competent flock of barred Plymouth Rock biddies are kept constantly on duty laying eggs with which to stock these hatching machines, and 450 eggs are placed in them each day. In connection with the incubators in use there is a row of pens numbered from one to ninety. Each day the little chicks from the machines are turned into the first pen. They are advanced one pen a day, and when the last one is reached they are ninety days old, weigh a pound and a half and are ready for the market. They are herded from the incubators through all of the pens and finally into the coops without being touched. They are not handled until the cook wrings their neck and dresses them for the frying pan. A certain proportion of the eggs do not hatch, and all of them that are hatched do not live to make the trip through the ninety pens, but the percentage of loss is comparatively small, and the breeder finds that the 450 eggs which go into the incubators every day easily net him 300 perfect broilers at the coops which are shipped to the city daily from pen No. 90. In order to carry out this system and meet his contract it will be seen that the poultryman has something like 30,000 chicks constantly on hand, to say nothing of the hundreds of dozens of eggs tied up in the incubators or the great flock of laying hens that supply the eggs. But he gets to market with his daily order just the same. This man made one fortune manufacturing furniture, but he is making a larger one now in the poultry business.

PERFECTING THE WIRELESS TELEGRAPH

CAN a message be sent to Europe without an ocean cable? That is the query which Nikola Tesla says will be answered affirmatively within eight months. In making such an assertion Mr. Tesla describes the perfection of his latest invention in these words:

My experiments have proved a great success. I am now fully satisfied that I shall be able to telegraph, not only to Paris and London, but to any city in the world within eight months. There have been two great problems requiring the closest study of electricity as pertaining to wireless telegraphy. First, it is necessary to develop the force that will carry the message a second, and to isolate the messages and guarantee their perfect reception at the terminal. The instrument at either terminal will be absolutely free from extraneous disturbances. I believe I have now succeeded in eliminating outside influences, and can make one set of instruments work free from another almost with touch.

There are two apparent points of difference between the Marconi and Tesla systems. The young Italian relies upon the ether to convey his messages, while Mr. Tesla employs the earth as a conductor. Then the particular form of energy employed by Marconi and Slaby is believed by them to be the so-called Hertz waves which are not electricity, though produced by electrical apparatus. Mr. Tesla, on the other hand, utilizes true electric waves, of great power and frequency, such as cannot be generated by his much talked about "oscillator."

The advances which Mr. Tesla says he has made within the last year or two consist of the improvement of power of his generating devices and in the perfecting of his receivers, which are so designed as to respond only to messages intended for them.

UNIQUE EXAMPLES OF THRIFT

LIVED ON 5 CENTS A DAY

A NEW YORK young man, Bernard A. Macfadden, has just completed a fast of fifteen days, during which he lived on food that cost him only five cents a day and claims to have felt better, worked harder and accomplished more with his brain than on diet of the ordinary food for a similar time.

"My food for the fifteen days cost me just 84 cents," he said in reply to inquiries. "When I was through there was a little left over, which made the actual cost average 5 cents. My bill of fare was made up from the following goods bought before the experiment was tried:

One pound crushed oats	$0.03
Water cress	.05
Three pounds white beans	.15
Two pounds red kidney beans	.10
Three pounds rice	.19
Three pounds dried peas	.12
Two pounds corn meal	.05
Ten apples	.10
Six turnips	.05
Total	$0.84

"In the beginning I fasted for two days before I started in to try my experiment. I am not a faddist in this line, but so much has been said about the capabilities of the cheap diet that I determined to try it for myself. After two days fast my digestive organs were ready to commence their work on a fair foundation. Of course a man would not have much appetite for such a diet as this unless he was pretty hungry, and that was one reason why I fasted. Fasting never hurts any one. Some of the greatest intellectual triumphs have been made by men who had previously fasted. Some of the greatest feats of strength have been accomplished by men who had eaten little before.

"After two days' fast I felt like eating a cake of unleavened bread made of crushed oats and water, partly baked, and it tasted exceedingly good to me.

"The beans I merely simmered, not boiled. It is claimed by raw food specialists that food should not be thoroughly cooked, because cooking destroys the cellular life. This seemed reasonable to me and for that reason I did not boil them hard and long, but just simmered them slowly till they were soft and palatable. I would take six ounces of beans and dried peas and, mixing them with rice, simmer them on a stove all day. In the winter the system needs more heat, and starch will heat the blood as nothing else will. So for starch I put in the rice.

"This made a meal that was so good to eat that I looked forward to it all day long. I did not eat any nuts for the reason that nuts would have cost too much for a five-cent fare.

"Rice and beans filled the bill quite as well. Rice, you know, is an old food and has been proven over and over again to contain many valuable things.

"I made two meals a day. That is quite enough. I generally had a meal at 9 in the morning and another at 6 or 7 in the evening.

"I would not have any one think that I recommended a diet of five cents. But I do declare it is a possible diet, and people could live indefinitely on it. But a diet approaching it in general principles would be good for any one."

A FACTORY GIRL ON $2.50 A WEEK

FEW realize what it means to live and work on $2.50 a week in the city, yet there are scores and hundreds of factory girls who receive no more. The Philadelphia Times has been making an investigation to learn how it is possible for them to exist and tells the story of a typical instance, a country girl left an orphan and forced to support herself:

This girl lives within walking distance of her factory. Her home is a boarding house run on a peculiar economic plan. While it is conducted in a way to be of benefit to its owner, it also does a sort of "hardlines" missionary work among the girls. The girls, six or eight in number, are boarded for $2 or $2.50 per week, as the case may be, according to what they earn. They sleep two, and, sometimes more, in a room. They also have the privilege of doing their own washing and ironing, and some sewing. Sometimes the boarding mistress keeps one servant; sometimes she keeps none, for each girl suplements the small amount she pays for board by her own work, utilizing her otherwise leisure hours in housework.

This particular girl rises at 5:30 in the morning or earlier, scrubs the floor, eats her breakfast and gets to the factory before the bells ring 7. At noon she hurries home and eats her dinner, meanwhile helping the others. Then she hurries back again to the factory until 6 o'clock.

After supper there are great piles of dishes to wash, dry and place again on the table, ready for the breakfast tomorrow. This done there are potatoes to peel, perhaps turnips to slice, or onions to make ready for tomorrow's dinner. Any vegetable that can be prepared and placed in cold water ready for the next day is taken care of by the girls.

Perhaps the next morning is the one for laundry work. If so, she must rise earlier, gather together her garments and hurry down into the kitchen and do her washing—hanging it out on the line before she leaves for her day's work. The ironing may be done in the evenings, when there is no other special work to do about the house. Between the housework, the washing and ironing and the bit of sewing accomplished, the day's work draws itself into something like seventeen or eighteen hours. Occasionally she has a part of an evening, and occasionally a part of a Sunday. But for the most part it is work, eat, sleep, rise and work again, from one month's end to another.

Her clothes are bought at the bargain counters, the 3 and 4 cent calico furnishing dresses, 49 cent shoes, out of style, 15 cent hats with a few ribbons picked up at remnant sales and other things to match. The only hope of the future is a "raise" at the factory or that some time she may preside over a modest home of her own.

A COMPETITOR WITH UNCLE SAM

R. L. NELLIS of Denver has entered into competition with Uncle Sam in the delivery of local mail matter. He underbids the government, and is carrying sealed drop letters throughout the city for 1 cent each, thus saving the sender 1 cent on each letter. Nellis believes that the plan upon which he has hit is such a good one that there will not be a single big city in the country but will have adopted it in less than five years, with the result that the government will be deprived of a great part of its income from the sale of stamps in the great centers of population, unless the Postoffice Department, for self-protection, should reduce its drop seal letter rate.

His patrons so far are confined largely to the big mercantile establishments and circular advertising concerns of the city. Some of these send out thousands of drop letters every month. So far as known there is no federal law that Nellis violates in thus competing with the Postoffice Department. For years he has made a thorough study of the best methods of sending out large numbers of monthly statements and circular matter. He has also given much thought to the delivery systems used by metropolitan newspapers, and has learned that newspaper carriers, who make but a small margin on papers, are able to earn good incomes when their routes are large. With these two plans as criterions, he has evolved his present drop letter carrier system in Denver.

At present Nellis is operating his service largely in the downtown section, but is rapidly expanding his business so as to include the entire city. He has been delivering by his plan less than a month. He started in single-handed, but the volume of his service has so increased as to enable him to employ five carriers, and he expects as the business justifies to have as many carriers as the local postoffice. He makes only two deliveries a day, but expects soon to provide for three or more deliveries daily, and ultimately to render a service equally as efficient as the postoffice. Unlike the government, he places no restriction upon the weight or size of letters, provided, of course, his patrons do not try to take advantage of him by loading his carriers down with heavy and unwieldy matter. He delivers for 1 cent letters that the postal rate would require 10 and 15 cents for.

At first he was intrusted with the delivery of letters of only minor importance, but his work proved so prompt and efficient that he has really taken the place of the postoffice in a measure with many firms for whom he delivers. To facilitate matters he has supplied his patrons with mail boxes, where his carriers collect the mail. It is then taken to his postoffice at 1646 Arapahoe street, and there routed for delivery. One of the chief advantages of Nellis' system is that it does away with the stamping of leters, thus saving time and labor. Every piece of mail matter is counted by the sender and by Nellis, and a settlement is made on that basis. Nellis' records already show an average delivery of 22,700 letters a day.

This suggests some of the possibilities today of the constructive mind.

The Danger is in the Neglect!

That persistent, tickling cough, if not cured now may hang on all winter and lead to lung troubles. It's what a cough may lead to that makes it dangerous. Be armed against danger by keeping always in the house, ready for use,

HALE'S

Honey of Horehound and Tar

Containing the soothing honey, the strengthening horehound and the antiseptic tar, it is a speedy cure for the most obstinate cough. It will not derange the weakest stomach and is a standard remedy for affections of the throat, recommended and prescribed by leading physicians. Of all Druggists. Refuse substitutes. Be sure and get

Hale's Honey of Horehound and Tar

Pike's Toothache Drops Cure in One Minute.

THE PARCELS-POST OF GERMANY

IN view of the fact that the United States is considering the establishment of a parcel-post these words from Edward T. Heyn of Berlin in the The Chicago Record will be especially timely. The German system is the most highly developed of any in the world:

Last year Germany transmitted over 184,621,000 packages, leading every nation of the world having a parcel-post system. By the courtesy of Postmaster-General von Podbielski, who delegated an official to accompany me on my investigation, I was permitted to visit the main building in Berlin, where the packages are received and distributed.

There are branches of the parcels post all over the city, but the largest building where packages are received is at the Oranienburger strasse. This building is a large structure, occupying a whole square, and having somewhat the appearance of a fortress. It has a large courtyard, where can be seen numerous yellow wagons, frequently observed in all parts of the city, which deliver packages. Recently a number of automobiles have been introduced for this purpose.

The German postal department carries packages under the following regulation: The officials are very particular as to the packing of parcels, requiring goods of a perishable nature to be so enclosed in oilcloth or thick paper, boxes, etc., that the weather cannot affect them. It is also required that packages of value shall be sealed with wax. Nothing combustible can be sent, nor butter, cheese or game in the warm season. Trees and shrubs can be forwarded by parcel-post, if the place of shipment and delivery are on direct railroad lines. Parcels can be sent by hurried and special delivery on payment of one mark, in addition to the regular postal fee. Packages can be sent C. O. D.

The following charges are made by the government for the carrying of packages: for packages weighing five kilograms (11 lbs.) 10 pfennig (2½ cents), and for heavier ones 15 pfennig (3¾ cents) or more. In postoffices of smaller towns five kilos cost 5 pfennig (1½ cents), and heavy packages 10 pfennig (2½ cents). The postoffice is responsible for lost parcels to the amount of one thaler (75 cents) per pound (500 grams) and also pays one thaler on lost packages weighing less than a pound, so that a thaler is the minimum reimbursement.

An important work of the German parcels-post department is the sending of packages to other countries. According to the arrangement with the United States, dated Aug. 26, 1899, packages can be sent to America at the following rates: For one kilogram (2.2 pounds), 1 mark, 60 pfennig (40 cents); over 1 kilo up to 5 kilos, 2 marks, 40 pfennig (60 cents). According to the latest statistics the following was the exchange of packages in 1899: From America to Germany, 4,429 packages weighing 10,240 kilos (22,748 pounds), valued at 113,200 marks; and from Germany to the United States, 13,975 packages weighing 337,700 kilos (82,940 pounds), valued at 104,800 marks. It is an interesting fact that one can now send a package from Berlin to New York cheaper than from New York to Chicago. In this connection I also learn from Consul-General Mason that of the increase of 51,000,000 marks of exports from Germany to the United States only a small share of the postal parcels are included because only those above $100 need to be invoiced.

The German parcels post has made possible the sending of small packages thro' the mails to the most distant part of the empire. While it has enabled the producers of agricultural products to send their goods to the cities, in return they receive at a cheap rate the manufactured products of these centers. The producers and consumers have thereby been brought more closely together. A very interesting feature created is the establishment of numerous industrial enterprises in the country districts, removed from the expensive surroundings of the city. On the other hand the business houses of the cities have also secured advantages, for while formerly commercial travelers would frequently visit the provinces they now go but two or three times yearly, gather up samples of goods and send them in small packages by parcels post to the country, which formerly were sent in bulk by freight, causing a great loss of time to the merchants ordering goods. In consequence the traffic in the overburdened freight departments of the railroads has been somewhat decreased.

Whether or not the German parcels post is a financial success, is difficult to prove, as the whole system is intimately connected and operated with the other departments of the postoffice. It is to be presumed, however, that the surplus of 51,844,870 marks, which the German postal department paid last year, includes profits derived from the parcels post.

The opposition of the express companies may hinder immediate action on this subject, but it is the natural outgrowth for the future.

PROGRESS IN DISCOVERY, SCIENCE AND INVENTION

USE OF PHOTOGRAPHY in SCIENCE

THE application of photography to the study of Natural history and in scientific explorations is growing in importance. Naturalists in the past year have obtained snap-shots of fish leaping from the water; of birds flying, fighting, eating and sleeping; of moose, deer, and bear engaged in various activities and most notable of all, of a wildcat about to spring upon its prey from the branch of a tree.

Dr. Stubel and Professor Sapper, it is said, have photographed more than twenty-five volcanoes in eruption, and have obtained striking views of explosions, lava cataracts, and other plutonic features. The engineers now working for the Imperial Government in German East Africa carry a first-class photographic outfit and take pictures of lakes, rivers, mountains, towns, and other places of interest; of natives, wild animals, and new botanical forms, so that their reports are treasure-houses of information.

The same rule is now followed by the official explorers sent by the Russian Government to the Pamirs, northern Siberia, and Kamtchatka. By taking fore and aft views along their journey at stated intervals, they obtain better material for a guide-book than any amount of description would be. Some of Professor Haeckel's students have devised a system whereby they can secure views, almost kinetoscopic in character, of animals whose life-habits they are studying.

TWO PREHISTORIC REMAINS

SCIENTIFIC circles have been stirred with the announcement that the bones of two dinosaurs have been found in South Dakota. It is one of the most important discoveries of a year. The first discovery was made last fall by a member of the United States geological survey, who called the attention of the American Museum of Natural History of New York to the big bones that protruded from the jura-triassic clay. An expedition was organized by that association and Prof. G. R. Weiland was put in charge. The first discovery was a vertebra of very large size, coated over with iron and silica, making it look like a boulder. A few feet from this a femur was discovered which is fully six feet long and at the smallest place is twelve inches in diameter. There are a great many smaller bones scattered over the surface in the immediate vicinity of the first discoveries, and it is believed that when warm weather comes it will be possible to find practically all the bones of the huge animal.

Near the place where the first large bones were discovered were found bones which are supposed to have been those of another lizard, smaller in size than the first. By careful estimates made by Prof. Weiland, it is thought the larger animal was fully eighty feet long and the smaller one sixty feet. The bones excavated have been carefully covered over with either plaster of paris or thick paper to prevent their being cracked by frost. The bones are all very easily broken.

It is the theory of Prof. Weiland that the bones discovered on the Fort Meade reservation floated down from Wyoming in a large stream of water that once had its course through this part of the country. The animals lodged against a bar in the course of the stream and there remained until covered by possibly hundreds of feet of clay. The erosion has been going on constantly for perhaps 2,000,000 years.

WIRELESS TELEPHONE in FRANCE

M. MAICHIE, a well-known French electrician, has just constructed the first wireless telephone. He has tried the invention successfully in the woods of St. Germain. The transmitting apparatus was placed in a house on the outskirts of the forest. It communicated with the earth by means of a metallic cable, described as similar to the chain of a lightning conductor, which was driven a certain depth in the ground.

About half a mile away in the woods two iron posts, connected by a conducting wire, were planted in the ground ninety feet apart, a damp spot being preferably chosen. To one of these posts was attached an ordinary telephone receiver. The voice of a man speaking into the transmitting apparatus at the house was then distinctly heard. The ticking sound of a special instrument, consisting of clockwork moving a needle which struck a bottle of mercury, was also clearly perceived. Mr. Maichie has not disclosed the secret of his invention. He states, however, that the communication in his wireless telephone is established, not as in the case of the Marconi wireless telegraph by a wave curent, but by a circuit current.

The importance of this fact is understood when it is explained that M. Maiche in some manner is able to direct the current traveling in a straight line from the transmitting apparatus, and, as it were, to aim at a given spot. If the receiver is not placed exactly in the direction given to the current no transmission is obtained. Receivers placed on either side of the line followed by the current are not in any way affected by the latter. His experiments have proved the principle of the wireless telephone an established fact.

REASON and INSTINCT CONTRASTED

MR. HENRY CAMPBELL in the London Lancet discusses the subject of man's guide in meeting the ordinary questions of everyday life in these words:

I say we cannot expect instinct to be a trustworthy guide unless the environment is a simple one and has been stable for several successive generations. It is clear that neither of these conditions obtains in the case of man, especially civilized man. His environment is infinitely more complex than was that of his primitive ancestors, and it has moreover varied, and continues to vary, very considerably from generation to generation—it has become, i. e., unstable and pari passu with, and as an inevitable result of, this increase in the complexity and instability of the environment, instinct has become less and less adequate as a guide, and reason more and more essential. Hence, with the evolution of reason there has been a concomitant dissolution of instinct, until, when we arrive at civilized man, we find the one guide all but superseded by the other.

Now this places man at a disadvantage as compared with the brutes, since the guidance of reason is not by any means so trustworthy as that of the instinct which it has replaced. It is needless here to enter into a psychological exposition of the defects of reason as a guide for man. To do this with any sort of fullness and completeness would be to write a book on human error. But what does concern us, and that most intimately, is that under the working of this new arrangement, as we may call it, man is continually going wrong in matters physiological, and it is most difficult to set him right. Do not we physicians see him persistently sinning against the laws of health, and that with a temerity that would be utterly amazing did we not know that beneath the temerity there lies a still more astonishing ignorance of all the laws of his being. It is often a task of much difficulty to enforce the most elementary principles of hygiene even among the educated classes; among the uneducated it is well nigh impossible.

GREAT BRITAIN'S PACIFIC CABLE

A GREAT step towards the unity of the British Empire has been taken in the determination to establish an electric cable beneath the waters of the Pacific Ocean, to bring into direct communication Great Britain and Australasia, and to connect the Commonwealth of Australia with the Dominion of Canada. This has been the dream of many a colonial conference, a dream which will be realized in little more than twelve months' time, at an estimated cost of one million seven hundred and ninety-five thousand pounds. At present the cost of telegraphing from Canada to Australia is prohibitive; for it is necessary to send the message first to England, next across Europe to Egypt, then by the Indian Ocean to India, and finally by a devious route to Australia. Chamber's Journal states that the new cable will not touch foreign lands; and its length, from Vancouver to Queensland, will be eight thousand nautical miles, a branch cable of five hundred and thirty-seven miles carrying the messages to New Zealand. It is a great scheme, in which imperial defence has been the first consideration; but it will surely lead to enormous commercial advantages.

THE GREAT NILE DAM

GENERAL JOSHUA L. CHAMBERLAIN, ex-Governor of Maine and for eight years president of Bowdoin College, has been traveling in Egypt for nearly four months, and among other points of interest visited the great Nile dam. When this is completed he is of the opinion that it will be as wonderful a piece of work as the pyramids, and that its value from a commercial point of view will be inestimable, because of the great acreage which will be made available for cultivation.

The Health Boards

have done the cities grand service by their efforts to secure cleanliness, but the dust of the streets is still laden with disease germs which collect on our clothing and would be absorbed by the skin if it were not for the daily bath. The simple use of pure water is not enough to rid the skin of these impurities. Sulphur destroys disease germs, and as combined in

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a disinfecting, cleansing soap is produced that has stood the test of years in purifying and healing qualities. Be sure and get

Glenn's Sulphur Soap

The daily use of this soap promotes health. For sale by druggists generally.

Pike's Toothache Drops Cure in One Minute.

THE VICE-PRESIDENT'S POWER

IT was generally considered when Colonel Roosevelt was elected vice-president that he buried his presidential hopes on entering the Senate. The ex-vice president, Adlai E. Stevenson, however, believes there are large possibilities before him in presiding over the Senate. He writes to the editor of the New York World as follows:

But for the imperative necessity of providing against the dangers of even a temporary vacancy in the chief executive office that of vice president would not have been created. In the scheme of government formulated by the convention of 1787 there could be no place for such an officer.

In the great executive office the President stands alone. Neither his power nor his responsibility can he share with another. Those who aid in the work of governmental administration do so by his appointment and subject to his authority. It will be seen, then, that the vice president, though elected in like manner and possessing the same constitutional qualifications as the President, is in no sense an executive officer.

That his position would be an anomalous one was recognized by the convention. An office was created without duties to be performed by its incumbent. The situation was at length relieved by assigning to this officer the duty of presiding over the senate. This was at once recognized as a position of responsibility and dignity.

In comparison with the influence exerted upon legislation by the speaker of the house of representatives, that of the vice president is infinitely small indeed. The speaker is a member of the body over which he presides, with the right of speaking and voting upon all questions. He is the chosen leader of the dominant party in the house and appoints all its committees. In close touch with the chairmen of the respective committees (all of his own appointment) he can in large degree hasten or impede legislation at his own pleasure.

In striking contrast to all this the power of the vice president over the proceedings of the senate is but as the dust in the balance. And yet without the right to speak, or even vote, except in the possible contingency mentioned, more than once in our history he has been potential in legislation.

The Walker tariff bill of something more than fifty years ago passed the senate by the casting of Vice President Dallas' vote.

The protracted struggle over the organization of the senate immediately succeeding the inauguration of President Garfield will be remembered. In this instance the organization of the body and much important legislation that followed was consequent upon the casting vote of Vice President Arthur.

From a consideration of the constitutional provision quoted, it is clear that the real power of the vice president is contingent. And yet, the instances above, given out of many that might be cited, render it equally clear that the contingency has been of frequent happening by which this officer became a potent factor in important legislation.

CONTENTS OF MAGAZINES

IN what are magazine readers most interested? This question is taken up and answered by the New York Independent by an investigation. The editor says:

It has been said that nowadays the chief duty of an up-to-date magazine editor is to keep the the literary aspirants out and to get the celebrities in; and, furthermore, that articles must be "timely" above all else, if their authors expect to have them considered. We have been interested to test this nebulous hypothesis in the February issues of the Atlantic, Century, Cosmopolitan, Forum, Harper's, Lippincott's, McClure's, Munsey's, North American Review, Review of Reviews, and Scribner's. By dividing the total of articles and authors in these magazines into the following categories (dogmatically perforce) we get the following result:

Timely	45
Non-timely	106
Doubtful	18
Authors:	
Celebrities	65
Recognized authors	53
Others	51

Furthermore, 32 of these articles were on public affairs; 8, science; 2, religion; 17, biography; 6, art; 9, literature; 51, fiction; 16, verse, and 28 miscellaneous. Hence we can affirm that the "timely" article and the celebrity are not yet predominant. The fiction writer is the most sought after of all the literary aspirants or celebrities; and the magazines are not yet completely "newspaperized." Were it not for the North American Review, Forum and Review of Reviews, a better showing yet would be made from the conservative standpoint. Harper's, for instance, has not a distinctively timely article in its February issue.

RELIGION, PHILANTHROPY AND REFORM

CATHOLICS IN EUROPE

THE proportion of Catholics to the population in European countries is an interesting study, especially in view of the difficulty in securing accurate information from Catholic sources in the United States. Herr Paul Baumgarten, in the London Tablet, gives an exhaustive treatment, of which the following is a summary:

The total population of Europe is given as 392,220,598, with 180,017,283 Catholics. There are 162,374 churches, chapels, etc.; 248,199 priests, including 184,535 secular and 21,689 regular clergy; 31,093 houses of the different religious orders, with 463,463 members, of which 6,050, with 146,257 members, are for men and 25,043, with 317,206 members, for women, and there are 56,928 students in theological seminaries. The figures of population given below are from The Tablet:

	Population.	Cath- olics.	Per cent. of Cath- olics.
England.....	31,957,129	1,318,468	4.3
Scotland.....	4,281,850	403,740	9.4
Ireland.....	4,535,516	3,424,592	75.5
Scandinavia....	9,473,982	12,527	.1
Holland.....	5,074,632	1,710,485	33.7
Germany.....	54,324,000	19,236,819	35.4
Austria-H'ng'ry	44,744,651	37,590,822	84
Belgium.....	6,669,732	6,650,232	99.8
Luxemburg....	214,400	212,200	99
Switzerland....	2,917,754	1,187,642	40.9
France.....	42,820,763	39,138,897	91.4
Spain.....	18,724,912	18,666,048	99.6
Portugal.....	5,833,783	5,832,783	99.9
Italy.....	32,936,100	32,854,100	99.7
Greece.....	2,433,806	72,495	2.9
Balkan States..	17,422,330	360,150	2
Bosnia and Herzegovina.....	1,591,030	334,142	21
Russia.....	106,264,222	10,948,141	10.3

LENTEN HYPOCRISY

REV. WARREN J. JOHNSON of Philadelphia believes that the modern way of observing the season of Lent is doing more harm than good. He says:

The observance of Lent has become fashionable. This is to be regretted, for fashion is often the fell destroyer of that which is religious and spiritual. If religious observances are to be determined by the fickle mandates of fashion they are doomed. There is great danger of making a mere mockery of this sacred season of the church year in which self-denial and abstinence are practiced.

It is a sad commentary upon our religious life that as many gaieties and amusements as possible are crowded into the days preceding Ash Wednesday, as though every moment must be snatched for pleasure ere sackcloth be donned. And the Lenten season is by many regarded so dull that they ponder what new pastime may be invented to while away the tedious hours of these forty days. To many Christians the observance of the Lenten season is as a galling yoke. How they long for the close of the season, so that they may re-engage in the world's festivities and gaieties! And too often, alas! the solemn hours of Passion week are spent in making preparations for the festivities and amusements of Easter Monday. What an abomination in the sight of the Lord must be such an observance of Lent! The prayer book may be carried never so carefully and the body dragged never so regularly to the Lenten services, unless the heart and mind center upon the sufferings of Christ it is but Lenten hypocrisy. From the deepest recess of the heart must gush the Lenten litany. 'From pride, vainglory and hypocrisy, good Lord deliver us.' The world can never contemplate too fervently the agonizing sufferings of Christ. His divinity made His humanity none the less sensitive to suffering.

The true significance of Lent is found in so mortifying the passions and appetites of the body as to permit a higher life to enter the soul, quickening new pulsations of love and devotion.

FAMINE CONDITIONS IN RUSSIA

THE thousands of Americans who contributed to the Russian famine a few years ago will learn with regret that serious conditions again face large sections of that country. A correspondent of the London Daily Express states:

In the governments of Kherson and Bessarabia tens of thousands are famishing. Amid the additional hardships of the severe winter, hunger typhus is rapidly spreading also.

The condition of the peasantry in the famine district of Southwestern Russia is equally lamentable; but it is worst of all in the northern and eastern Volga provinces, where the people for two months have been subsisting on roots, grasses and offal, and are now dying of sheer starvation. As in previous famines, the absence of sufficient rolling stock prevents a distribution of stored grain to the famine districts.

RAILROAD TEACHES EMPLOYES

THE Lake Shore & Michigan Southern Railroad company has turned educator. At its big shops at Elkhart, Ind., it has established a school for its apprentice boys, who are compelled by the rules of the institution to attend all sessions unless conditions justify their remaining away. The railroad company pays all expenses entailed in maintaining the school.

The courses of study are of a purely technical character, being such as are practically applied by machinists and mechanics. The school sessions are held at night, and C. A. Tousley, one of the company's head draughtsmen at the shops, is the chief instructor. The boys are taught mechanical drawing and such conditions figuring in engineering work as weight and dimension finding.

The action of the Lake Shore in establishing the school is in line with the agitation for more technical learning in employes reared from apprenticeships. Some of the most prominent railroad officials in the country for a long time have strongly advocated the establishment of schools for boys and men in the employ of railroads, and a few of the roads have taken steps in the matter.

INSTEAD OF REVIVAL

MANY Christian people deplore the lack of revivals. They feel alarmed when they see no great evangelist like Mr. Moody bringing thousands into the kingdom. The situation in many churches, however, shows that there may be a quiet work of grace as well as a sudden and startling effect. This topic is treated by The New York Independent as follows:

The Methodist Episcopal church in this country has announced the intention of securing, if possible, the adhesion of two million converts as a centennial gift to the Lord; and the method to be usually employed is that of revivals. But the winter is now well along and there is hardly a shaking in the mulberry trees.

A generation or two ago revivals were the accepted order of religious activity in the churches. Once in perhaps seven years the churches would conclude that their numbers were being depleted by death, that none were taking the places of those who died, that coldness and irreligion were prevalent, if not immorality, and that it was time for a revival. An evangelist would be called, the pastor and members would give their help, meetings would be held every night for a month, and some scores of converts would be gathered in. It was a good and useful work and no other way was known. After the converts had been baptized and received, the interest in religion would decline, and seven more lean years would follow. But of late the revivals are apparently coming to an end. Our city churches have none, and in the older section the country churches have none. Yet their membership increases. Their accessions come in other ways.

The purpose of the revival is to secure conversions, but it is only a second best way to reach the end. Its reason rests in a bad religious condition which requires heroic means of treatment. The gentle rain is a better force than the deluging hurricane; the quiet teaching of the young is a better way to secure good Christian character than that which would smite down the hardened and callous soul. The progress of Christianity and the multiplication of religious forces make revivals unnecessary, while Christian culture takes their place.

And why should we lament the old revivals when the new way is so much better? What is to be desired is that which every respectable religion requires, and which, in our common parlance, we call conversion—what Jesus meant when he said: "Ye must be born again." It is the conscious resolve of the soul to live the life of self-sacrifice in obedience to the will of God; it is the consecration of all one's powers to the service of God and man; it is that love to the great sum of Being, divine and human, in which self is swallowed up, as the drop in the ocean. Even if it be gained through some "disturbance of the soul" and "strong compunction," the result is the most blessed achievement of man's religious nature; but Wordsworth's way is better, which finds it "in the quietude of thought," and we cannot but be pleased that the church is now securing its converts in other ways than by revivals.

QUAINT, CURIOUS AND SINGULAR

FINEST CHAPEL in GREAT BRITAIN

KING'S COLLEGE, Cambridge, possesses the finest and most magnificent chapel in the United Kingdom. It is the latest and most sumptuous example of the perpendicular order of Gothic architecture, and the chapel dominates over all the buildings in the town and university. The fretted roof, unsustained by a single pillar, is vaulted into twelve divisions. The center of each is a pendant keystone, terminating alternately in roses and portcullises, each keystone weighing more than a ton. Over the stone roof is the timber roof. An organ separates between chapel and ante-chapel. The painted glass is the most remarkable that has been bequeathed by the age of Henry VII. and Henry VIII., and belongs to a time when the art of painting had attained its highest excellence. There are five-and-twenty windows, with more than a hundred panes.

A CITY IN TWO STATES

BRISTOL, Tenn., has recently been ceded to Virginia, and thereby hangs a curious tale. The main street of this bustling little city of 12,000 has been the dividing line between Tennessee and Virginia and the postoffice address has been Bristol, Tenn., and Va. For many years there has been no end of trouble. Many citizens did not know which state they were living in, owing to the general dispute and some were taxed in both states. The Virginians used Eastern time and the Tennesseeans central time. The difference is just one hour, and when it was 12 o'clock, noon, in Bristol, Tenn., it was 1 o'clock p. m. just across the street in Virginia. Accordingly, the passenger who leaves the railway station in Bristol, Va., for points south at, say 10 o'clock a. m., arrives in Johnson City, Tenn., twenty-five miles farther south at 9:45 a. m., or apparently fifteen minutes before his departure from Bristol.

The barber who wants to do a Sunday business found it to his taste to locate on the Virginia side, as Sunday opening is forbidden in Bristol, Tenn.

Tennessee's anti-cigarette law, so long as it remained in force, was as chaff before the wind in Bristol, except that the Tennessee dealers were forced to shut up shop, while the Virginia merchants reaped a golden harvest. Those who tried to enforce any law in one state found that the lawbreakers had fled to the other state. Now this has all been changed.

A FRESHMAN AT SEVENTY-THREE

THE days of long ago seem to be revived in the appearance of Logan E. Bleckley, ex-Chief Justice of the Supreme Court of Georgia, one of the ablest judges in the entire South, as a freshman in the University of Georgia at the age of 73 for a special study of mathematics and political economy. The venerable jurist, who might well take the position of chancellor or occupy a professor's chair, simply announced to the officials, "I am going to enter the freshman class. I believe in starting at the bottom and going up. I may be able to complete the studies in all the classes before I leave college, at least that is my intention." Cato learned his Greek at 80 and Sophocles wrote his "OEdipus" after that age. Theophrastus at 90 had only begun his "Characters of Men," and Goethe finished his "Faust" when past 80. There may be new honors in store for the septuagenarian freshman of the Georgia University when his studies are completed and he goes out into the world.

MICE FOR HOUSEHOLD PETS

CERTAIN women in Chicago are planning a "mouse club," their object being to study the pedigree of the frisky creatures and learn to tell the difference between mice of high degree and mice of low degree. They are to give attention to the length of the fur and the length of the tail, and to learn to understand the characteristics indicated by big ears, little ears, thick ears and thin ones. Mousey's diet and housing and bedding are to be carefully considered, and only pedigreed Himalayan or English beauties permitted to frolic through the bureau drawers, to munch the chocolates or nestle in my lady's back hair.

Miss E. C. Copeland of Kenmore avenue is the inceptor of this unique club. She has for years raised the queer pets, and she asserts they are as tamable as a cat or a dog. The little creatures run all over her shoulders, and creep into the folds of her gown, where they hide from her and each other. The prettiest mice are the fine-furred gray with markings of pure white. This is a Himalayan of the gentlest breed. 'The blue one,' says Miss Copeland, pointing to a little fellow the color of a china blue teacup, 'is one of the rarest kind there is. He understands what I say and enjoys a romp as much as a dog would.' A big black cat now wandered in, and, after inspecting the mice, calmly retired to a corner of the room, curling himself up for a nap. Miss Copeland picked the two white mice out of their cage and placed them on the black cat's neck. The little fellows immediately dived under his chin and were lost to sight. 'There they will all sleep together for an hour,' explained the mistress of this happy family.

BEES IN A FLAT BUILDING

BEEHIVES in a modern flat building in a crowded city may seem incongruous, but are possessed by an enterprising Chicago man. He has found that city life is not conducive to laziness in the bee family, and that the busy little worker is just as industrious in storing away nectar when his home is known to the postman as apartment A, third floor, as he is when hidden away in a hollow tree out in the woods.

G. E. Purple, an architect employed at the Fisher Machine Works, is the owner of the bees. He lives at 622 Colorado avenue, and the bees live on the roof. They seem to prefer it. Mr. Purple is from Missouri ,and he has worked with bees ever since he was a boy.

SMALLEST BOOK IN THE WORLD

THE smallest book in the world has just been published in Cleveland. The type cannot be read without the aid of a powerful magnifying glass, and the work in size is no larger than one's finger nail. The work is a complete copy of the "Rubaiyat" of Omar Khayyam, and has also a fifteen page introduction and some other matter. The type for the work was made and then further reduced by photo-microscopy. Only fifty-five copies of the book have been printed; the plates, being made of solid silver, have been distributed among the friends of the author as souvenirs, precaution being taken to deface them.

SOME PECULIAR WILLS

WHEN Benjamin Franklin died, in 1790, he left a small sum of money, which was not to be used until the twentieth century. His gift is at last available, and the sum, a goodly one of $375,000, having been invested at compound interest. The trustees of the Franklin fund have decided to use the money for the erection of a Franklin Institute, in Franklin Square, Boston. It will be on the plan of the Cooper Union, New York.

Curious provisions made by wills are more common than one would suppose. Within the last few months there have been several examples of eccentric disposals of property. To one young woman is left $20,000 by her brother, under the express conditions that she neither marry nor become a nun. If the conditions are not fulfilled the money is to be distributed among other relatives.

To his three daughters, an Italian who recently died in New York left $300 a year each if they remained single and $2,500 a year if they married.

A late member of Parliament, London, England, left by will to his two daughters £144,000, with the provision that the money is only available if they attain the age of 35 years without marrying either a citizen of the United States or a Hebrew.

To provide for any possible widows who might try to contest his will, a Californian left $50 each. In this way 100th part of his fortune of $50,000 is disposed of.

More singular, even, than these odd bequests was Lord Bates' wish, expressed just before his death, that his heart should be taken to the Holy Land and buried on Mount Olivet, which was accordingly done.

SAVED BY A CAT

MRS. N. J. LLOYD, and Mrs. Belle Buckner, of Minneapolis, had a narrow escape from asphyxiation early one morning, and the fact that they are still in the land of the living they attribute to the actions of a young kitten. The animal had evidently been affected by the gas, which escaped from a coal stove, and awoke Mrs. Lloyd by scratching her face. When Mrs. Lloyd arose she endeavored to awaken the other woman, but found she was overcome by the gas. It took the doctor nearly an hour to resuscitate Mrs. Buckner.

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SOCIOLOGY, LABOR AND COMMERCE

NEW YORK to St. PETERSBURG by Rail

CAPT. JOHN J. HEALY, the noted Alaskan pioneer, in an interview by a daily paper, is quoted as making these remarkable statements:

I, no longer a young man, believe I will live to see a continuous line of railway from New York to St. Petersburg and other European capitals.

Such a highway in the nature of things is only possible by way of Bering strait, and work on one of the principal connecting links will be commenced within twelve months. I refer to the building of a railroad from Port Valdez on the sea to the American Yukon. That great enterprise will undoubtedly be inaugurated within a year.

This Copper river steel highway is sure to be built. After crossing the mountain range the railroad will follow the Tanana to its mouth in the Yukon. From this point nothing seems more certain than it will be projected to Nome, up through that district and across Bering strait into Siberia. Such a project would of course involve an international company and international co-operation, and those results will be forthcoming. It requires no great stretch of engineering imagination to conceive the idea of a railroad across Bering strait. It is but twenty miles on the American side to Dromede island and less than that to the Siberian shore."

AMERICAN STEEL ABROAD

IN the latest Monthly Summary of Commerce and Finance issued by Secretary Gage there is an elaborate review of the shipping industry of the United States. By an editorial oversight the following statements appear in it and become "official utterances" of Mr. McKinley's administration:

First, That on the Clyde, the chief centre of British shipbuilding, American steel ship plates are in general use and are sold at from $3 to $5 a ton less than British made plates, after paying $6 per ton ocean freight.

Second, That in November, 1900, alone, 150,000 tons of American steel material were ordered by Clyde builders from America because $250,000 was thereby saved on the cost thereof.

Third, That, according to Mr. G. W. Dickie, a leading shipbuilder of San Francisco, the (Dingley) tariff on steel plates and shapes enables the British shipbuilders to buy them cheaper than they are sold in the United States, and the duty on steel is no longer a protective measure."

SETTLING DISPUTES IN FRANCE

A REPORT to the State Department from United States Consul Skinner at Marseilles gives some details of interest regarding an organization established in that city by the French Government for the adjudication of disputes between employers and employes. The undertaking appears to be to some extent tentative in its nature. The mission of the new Council of Labor is to give advice upon all questions bearing upon labor; to prepare reports at the request of the Minister of Commerce and Industry; to publish the current and normal rate of wages; to determine the current and normal length of the workday; to seek means of preventing or terminating strikes or lockouts; to prepare reports upon the division of allowances made by the public to institutions of patrons and employes; to investigate and report upon the execution of laws, decrees and orders concerning labor and modifications which might prove beneficial thereto. For the present the Council is only granted advisory powers, the right of ultimate settlement still being left to the established authorities; but the idea is to enlarge its functions in the future.

The Council is formed of three elements —employers, employes and Prudhommes, the latter class being members of the Conseil des Prudhommes, which has had an uninterrupted existence in Marseilles since the period of the Roman occupation. This body has for its duty the conciliation of differences between employers and workmen.

A SOCIALISTIC TREND

THE socialistic movement in England and on the continent has made greater progress than in the United States, owing, no doubt, to the larger opportunities of individualism in our republic. National and municipal operation of public utilities has there flourished and grown to enormous proportions. The most recent and by some regarded as the most dangerous trend of our times is "municipal trading." In Great Britain "municipal trading" is an accomplished fact. Many cities have engaged in business under their present powers, and parliament has been asked to enlarge these powers in order to permit even wider commercial operations than have been attempted. The question has attracted attention and has been made the subject of a special investigation and report by a joint select committee of parliament. The investigation, however, was not completed, and the committee is to continue its sittings, and definite conclusions regarding the utility or inexpediency of municipal trading are therefore postponed. But a body of suggestive evidence has been collected, and this is presented in the preliminary report. To name first a few of the industries conducted by British municipalities: Model lodging houses, artisans' private dwellings, baths and wash-houses, cold storage, manufacture and sale of ice, abattoirs, nurseries, crematories and recreation grounds; shops and "bazaars," and even liquor saloons; fire insurance, real estate, coal supply, tailoring, printing, the making of lifts, saddlery, and electric fittings. Some of these industries, it should be stated, are only planned, parliament not having passed the pending bills to enable the petitioning cities to go into the proposed business. Some cities wish to engage in banking and have applied for authority to parliament.

In England and Wales 265 cities have already engaged in productive undertakings, and in Scotland seventy-four. This means that nearly half of the municipalities have entered competitive industry. The aggregate capital invested is nearly $500,000,000, and one is quite prepared to read that 94 per cent of this total is borrowed money. As in Australia, so in Great Britain the experiments in socialism are conducted on capital raised by loans, and the municipalities expect to clear a net profit after paying the market rate of interest and providing for gradual extinction of the debt.

In 1896 the British municipal debt was $1,250,000,000. It is much higher now, and the increase in twenty years has been 200 per cent. Municipal rates have, of course, also increased steadily. The annual expenditures authorized by parliament and the local government board have increased from $25,000,000 ten years ago to $195,000,000 in 1899. The municipal authorities are not deterred by these figures from enlarging the scale and multiplying the number of their operations, but there were some witnesses who questioned if the game was worth the candle, and whether the advantages were, or were likely to be, great enough to justify the risk, expense and the indirect consequences of this sort of local socialism.

The English papers are speaking of municipalities as "universal providers," for how is the line to be drawn between one kind of productive enterprise and another? But if cities become such providers small traders of all kinds will be crippled and driven out of business. Municipal socialism may be no small factor in weakening the ability of English capitalists to hold their own in the markets of the world.

STARTS CO-OPERATIVE PLAN

THE National Biscuit Company, with 7,000 employes, has announced that it will encourage the co-operative system and help all connected with the company to become stockholders. In order to become a stockholder it is necessary for an employe to make application to the manager of the plant with which he is connected, stating how much stock he wants to buy, and inclosing $5 as the amount of the first partial payment. This must be followed by regular monthly payments, according to the amount of stock taken out, and employes will be paid 4 per cent. interest on all money paid in until the stock is fully paid for, when they become full-fledged stockholders.

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The preferred stock of the company amounts to $25,000,000, and of this $23,825,100 is outstanding, being owned by 2,492 persons, of whom more than 1,000 are women. About $10,000,000 worth of the stock is owned by the officers, directors, managers of the plants and their families, but the remaining $15,000,000 represents outside capital. The market value of the stock at the present time is $92.50 a share, and for the three years during which the company has been in existence it has paid an annual dividend of 7 per cent.

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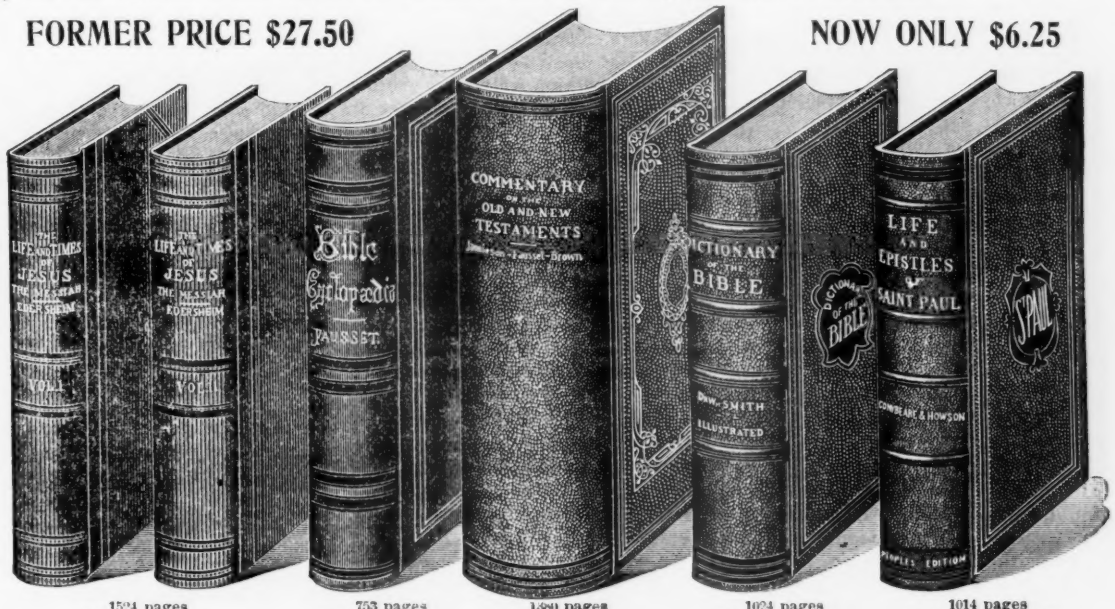

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EDUCATIONAL PROBLEMS OF OUR DAY

CHILD STUDY IN PUBLIC SCHOOLS

THE Chicago public schools have been going through a careful investigation in the study of the child and his mental and physical development. In the course of his report Director F. W. Smedley makes these interesting comparisons between boys and girls:

The pubescent period is characterized by great and rapid changes in height, weight, strength of grip, vital capacity and endurance. There seems to accompany this physical activity a corresponding intellectual and emotional activity. It therefore is a period when broad educational influences are most needed. From the pedagogic standpoint it is preeminently a time for character-building.

The stature of boys is greater than that of girls up to the age of 11, when the girls surpass the boys and remain greater in stature up to the age of 14. After 14 girls increase in stature very slowly and very slightly, while boys continue to increase rapidly until 18.

Commencing at the age of 13, strength of grip in boys shows a marked accentuation in its rate of increase, and this increase continues as far as our observations extend—viz., to the age of 20. In girls no such great acceleration in muscular strength at puberty occurs, and after 16 there is little increase in strength of grip. The well-known muscular differentiation of the sexes practically begins at 13. As with strength of grip, so with endurance as measured by the ergograph, boys surpass girls at all ages, and this differentiation becomes very marked after the age of 14, after which age girls increase in strength and endurance but very slightly, while after 14 boys acquire almost exactly half of the total power in these two features which they acquire in the first twenty years of life. The development of vital capacity bears a striking resemblance to that of endurance.

HANDIWORK OF BOYS AND GIRLS

THE training of the hands of a child in artistic and mechanical lines is sometimes rewarded by an unexpected development. Commenting on the National Exposition of Children's work in New York City, the New York Sun says:

The handiwork of the boys and girls of America, from Massachusetts to Arizona, is represented and the exhibition is in a way a mixture of the latent artistic and mechanical skill of the large army of children who have not the advantage of wealthy parents and relatives to help them to the tools and materials wherewith to show what they can do if they have a chance. This deficiency is supplied by scores of industrial and other training schools throughout the country, and the Sixteenth street exhibition presents the results of the patient work of little chaps from 4 to 16 years of age in all kinds of useful products.

There is a model of the battleship Maine, made by seven boys all under 14 years of age. The boys who made it belong to Gen. A. C. Kenyon's B. B. Brigade, and they did every bit of it themselves, even to the casting of the twenty guns of the armament and the smallest details.

Another exhibit is that of the American Training School for Girls in Cuba. The little senoritas who turned in the contributions of this group are all under 13 years of age, and the specimens of darning, mending, and patching and other needle work have been a revelation even to American instructors in this craft.

One of the interesting features of the Colorado public schools' exhibit is the figure drawing in black and white, the models being the school children themselves, who posed for each other.

The children of the Home for the Friendless—mere infants in years—have shown what they can do in the very serious and practical work of mending shoes. When a child of the home finds his shoes in need of repair he goes to the cobbler and takes a lesson while they are being mended. After a few experiences of this kind and a little practice he is able to mend his own shoes.

AMERICAN TEACHER in PORTO RICO

MISS HITCHENS, an American school teacher located at Quebradillas, writes hopefully of her work, and among items of news connected with her school, she says: "We are going to celebrate Washington's Birthday, and I begin Monday to teach our three national songs in English." She states that she has fifty pupils, from 3 to 8 years of age, and adds: "They seem like bright children, and judging from the quantity of oranges they bring me, perhaps they do not object to their new teacher."

BALTIMORE EDUCATION REFORMS

WITHIN a year considerable progress has been made in the general system of education at Baltimore. Mayor Hayes took the first step toward the divorce of the schools from politics by appointing a board of nine members representing the city at large, in place of the former board of twenty-two, one for each city ward, appointed by the City councilmen. This board was selected with a view to getting the best men available, such as President Daniel C. Gilman of John Hopkins University. The whole school system is to be operated for the benefit of the scholar, and not, as formerly, for the advantage of contractors for school supplies.

It is now the duty of the superintendent and his assistants to ascertain the training, knowledge, aptness for teaching, and character of every future candidate for the place of teacher, and to report to the Board graded lists. From these lists all nominations of teachers are made by the superintendent and his assistants.

The system of grouping has also been reorganized. There are now twenty-five groups, each group under a principal, and each school group in charge of a vice-principal.

Previously teachers for the schools were taken from among those candidates who had graduated from the Baltimore City college or high schools, but now a training-school has been established. It includes grammar and primary schools used for observation and practice. The training-school has two divisions, one for intending white teachers, and the other for colored teachers. These two divisions, though in separate buildings, are taught by the same faculty, thus insuring the same curriculum.

DOMESTIC SCIENCE IN COLLEGE

THE increasing interest in domestic science is leading some of the largest colleges for women to introduce such a course into their curriculum. A lecture course in domestic science was offered in Wellesley this year for the first time. It was hoped that a regular course in experimental cooking might be given, but for the satisfactory offering of the course, a specially fitted-out laboratory was necessary, and the money to carry out this design was lacking. Every effort is being made to render such a course possible next year. The course, as offered, consists of lectures on food, sanitation, and the care and artistic furnishing of the home. The lecturer is Miss Cook, a former Wellesley student, who has recently taken courses in domestic science in Syracuse University. Attendance at these lectures is not required by the college, but left to the pleasure of the students.

When the course is offered in its completeness, as is confidently prophesied for next year, the work will be more detailed and largely experimental. The chemistry department offers a course in the chemistry of foods, which will supplement the course in domestic economy. The new course will also require definite knowledge of physiology and hygiene. The most popular branch of instruction in this course will doubtless be experimental cooking.

GROWTH IN CUBAN SCHOOLS

TWO years ago in Cuba there were no school buildings, and anything rightly to be called school furniture was hardly known. It is estimated that there were at that time only about 200 institutions on the island to which the name of schools could be applied with any reason for the application.

A school order issued on December 6, 1899, provided for municipal boards of education and for payment of teachers and rental of buildings for school purposes. It also authorized each board "to expend a sum not exceeding $50 for furniture for each schoolroom." Text-books and minor supplies, pens, pencils, crayons, ink, tablets, etc., were to be furnished free to all pupils.

Taken all together, the expenditure of 1900 for educational purposes in the island of Cuba approximated $3,500,000. Recent reports show 132 municipal districts with 3,000 schools and 3,500 teachers. The system of monthly statements from every school and every district on the island is in operation; but returns are not yet all in. It is estimated that 165,000 children are on the school rolls, with 130,000 in daily attendance.

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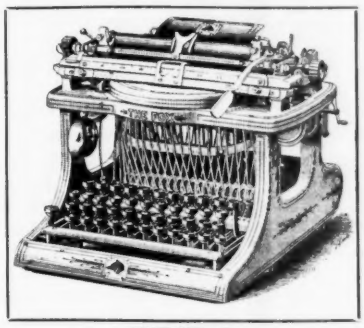

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THE NEW SENATOR FROM UTAH

THOMAS KEARNS, the new Senator from Utah, is likely to give a touch of gayety to the proceedings of the Senate. A Salt Lake correspondent of The Chicago Record calls attention to the fact that Mr. Kearns did not have superior educational opportunities in his youth, and in his later years he has been so busy acquiring wealth through mining that he has not had much time for increasing his book knowledge. But while Senator Kearns has been too busy to become an educated man, he has much native ability, and an ambition that prompts him to attempt to shine in circles in which education and culture are required. This ambition has been the cause of much amusement to many who have observed his oratorical and social powers.

Though the new Senator's mind has not been trained to consider public questions with precision, except, perhaps, those relating to the coinage of silver and the tariff on lead, he has views on most questions, and is inclined to be dogmatic in expressing them. In last fall's campaign in Utah Mr. Kearns went on the stump, and some of his utterances were made much sport of—openly by the opposition and quietly by members of his own party. In his discussion of the issue of Imperialism, Mr. Kearns cited the case of the purchase of Alaska as proof of the wisdom of Expansion, and was quoted as describing Alaska as "an island baskin' like a gem on the bosom of the Arctic Sea." A scoffing Democrat immediately sought to discredit Mr. Kearns's geographical knowledge. He defiantly resented the imputation of imperfect information, and thenceforth from his point of view the question as to whether or not Alaska was an island became the paramount issue of the campaign.

MINISTER WU AND a LAND AGENT

ALL sorts of people call upon Mr. Wu, the Chinese Minister at Washington, with all sorts of scheemes. One day the minister said he had just dismissed a visitor from the far West who had endeavored to enlist his interest and incidentally a little of his capital in a land scheme or town lot boom. A cute part of the game was that a Chinese colony was to be settled there and the place was to be made a sort of Mongolian paradise. After the boomer had outlined his prospectus and put all the brilliant colors of his imagination upon the canvas of his rhetoric, the simple and childlike son of the East took his innings. He began to ask questions. He wanted to know about the soil, the water supply, the original cost of the land, the railroad communications, the markets, the number and character of the people living in the vicinity of the proposed colony, the state of public opinion as to Chinese immigration in the state and neighborhood, and so on, and so on. Questions came so fast and furious that the boomer soon showed signs of fatigue. The climax came when Mr. Wu, profiting by his study of English political economy, waved his caller away with the exclamation:

"Your scheme is no good, no good, sir. How do you expect a colony of my countrymen to live? By taking in one another's washing, eh?"

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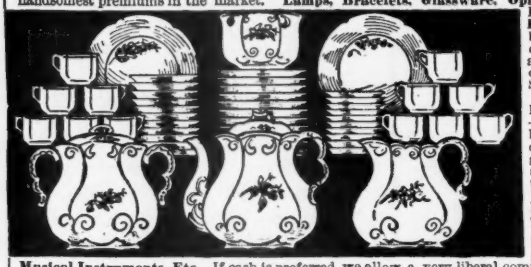

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CLOCKMAKER OF MANISTEE

THE local celebrity of Manistee, Mich., is Nels Johnson. He made himself famous as a clockmaker and in the meantime, for diversion, became a scientific astronomer, recently constructing a six-inch telescope and an observatory. He has risen from farm hand to machinist, from machinist to clockmaker and from clockmaker to be the peer of those with strings of titles to their names and far less of achievement to their credit.

Born on the Danish islands of Sjeland in 1838, of peasant parentage, he learned in infancy that his life mission was to work. He began to work on the farm at the age of 7 years, and he has been at it ever since, but that has not prevented him from thinking. He started for the new world with $12 in his pocket. When he landed at Quebec he was $40 in debt. He pushed westward and began his career as a blacksmith at Milwaukee at $1 a day. He could not speak English, but he had brawn, and could work the bellows or pound the red-hot bars lying on the anvil.

But while he worked he dreamed. From the door of his smithy he saw a machine-shop. He dreamed of becoming a machinist and making the insensible iron do his bidding. Within two years he had the best lathe in the machine-shop and was earning the highest pay in his class. But still he aspired to something more independent, and in 1871 he crossed the lake to Manistee, then a lumber town, to start a small machine-shop and foundry.

Within him was the impulse to move on into something better, and he soon turned to clockmaking. As a blacksmith's apprentice he had made an electro magnet to operate a pendulum. He drew the wire from a block of silver and wound it by hand with cotton thread. He constructed a clock while a machinist at Milwaukee, but it was not a success. He profited by the failure, and in Manistee he started again without education other than that gained in the shop.

So Nels Johnson, machinist and foundryman, turned astronomer to become clockmaker. He had never been to school a day in his life, and he soon found it was no child's play, this being an astronomer. He took up arithmetic, dug into it with determination and moved on into trigonometry. He got hold of a nautical almanac and a copy of Clark's transit tables. In the course of time their meaning slowly dawned upon him, and he learned to know the constellations. In the meantime he had saved enough money to buy a fine set of transit instruments, and it was a proud moment when he was able to say he knew how to use them.

But he discovered he was not yet an astronomer, and that spurred him on to new efforts. He bought a small telescope and several astronomical books. Then he got into the habit of dropping his clockmaking to run over to Ann Arbor to revel in the observatory of the state university and ask questions. He studied and experimented and observed and asked questions to such good purpose that able astronomers accepted him as a companion spirit. He has constructed all of his big telescopes except the lenses, and says it was "but the serious pastime of idle moments."